

57221

**FINAL EVALUATION**

**NIGER**

**FORESTRY AND LAND-USE PLANNING PROJECT**

**(No. 683-0230)**

**USAID/NIGER**

**Agency for International Development**

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FORWARD

(To be added by CDIE when Report  
is published)

## Summary and Major Recommendations

The Niger Forestry Land-Use Planning (FLUP) Project (683-0230) Evaluation was conducted during August 28 to September 18, 1987, at the request of the USAID/Niamey General Development Office and the FLUP Project Manager. The Evaluation Team, consisting of a team leader, forest economist, a forestry research specialist, and a resource inventory specialist, plus three Nigerien counterparts, conducted interviews with A.I.D. and GON officials, read numerous project documents, and conducted several field trips. The Team was given a specific scope-of-work, and emphasis was given to evaluating that portion of the Project developed after the Mid-Term Evaluation of 1983 and the Revised Implementation Plan of 1984.

In general, the Team found that significant progress has been made in the Project. The Evaluation Team feels that the project is on the verge of a major break through. After more than seven years of slow progress, the land-use planning learning curve has reached the "point of inflection" and it is ready to take a significant upward jump. With additional time, there will be substantial returns on the investments made in the Project in terms of lessons learned and directions for future natural resources development projects Agency wide. Furthermore, the presence of the Technical Advisor on the team as a planner, and the creation of the SPD have started to sensitize GON and other donors to the fact that planning in the forestry and natural resources sectors should be given priority within national policy formulation.

Financial analyses also indicate that the recurrent cost burden for the Service de la Planification et de Documentation (SPD) will be approximately \$90,000 per year (27 million FCFA) when vehicles are not replaced, and \$165,000 per year (50 million FCFA) when vehicles have to be replaced. In present value terms this amounts to approximately \$650,000 based on a 10 percent rate of discount, or the amount of money that would have to be deposited in the bank today at 10 percent to cover the recurrent costs of SPD over the next 10 years.

Under the present conditions at Guesselbodi, a degraded site put under management, an operating loss of 181,250 FCFA is shown during the first cutting year. A more realistic view is to look at the revenues vs/ the costs over a full rotation of 10 years. In conducting such an exercise, using conservative data from inventory work, analyses demonstrate that all costs are covered by the seventh year and have a net profit of 412,916 FCFA, not taking into account inflation and discount rates. In essence, putting the Forestry Land-Use Planning approach into use at Guesselbodi, will provide sustained yields of wood and forage with no recurring costs.

Planning issues within FLUP focus on the creation and functioning of the SPD. Although the condition precedent that the planning unit be created has been met, its ability to function as

originally intended is still far off. It is a planning unit essentially without tools and staffing at present. If the FLUP Project is to be extended, it is essential that all remaining Project activities be coordinated and focused on the SPD.

Management issues focus on the functional and operational relationships between the technical assistants and their counterparts, the Project and AID, and on Project finances. Although the Directorate of Forests and Fauna (DFF) has assigned counterparts to the project, none occupy any position in the Ministry with any real decision-making responsibility or authority. A.I.D. should insist that the Division Chief level of SPD be assigned with people who hold at least the equivalent of MS degrees; and, that the present counterparts be assigned directly to the Division Chiefs.

The Evaluation Team recommends that a team leader be assigned with the accompanying management authority to ensure that all remaining Project activities be coordinated and focused on strengthening the SPD, and that financial discipline in Project expenditures be maintained.

Forest research issues center on development of model sites and natural forest management. The Model Sites component has been determined to be a technical success, and it appears to demonstrate that natural forest management is both ecologically and economically viable. But, the probability of the FLUP approach to realize its full potential to help the rural economies is linked to a determined effort to follow-through on accomplishments to date. In particular, the DFF will need to further develop manpower as all facets of forestry land-use planning.

Training and documentation are critical issues. The documentation center component has the lowest profile in the Project. However, it is believed that continuation of the work underway in the project is extremely important, and it is recommended that current technical assistance personnel stay at the Center until at least December.

If there is to be a consolidation and extension phase of the Project, it is suggested that technical assistance be provided in both the model sites and documentation components. Both are at critical stages, and, if outside donor assistance is dropped, little of the potential will be realized.

Resource inventory issues comprise mapping in the five urban areas (Niamey, Dosso, Tahoua, Maradi, and Zinder), fuelwood inventories for the five urban areas, and fuelwood inventories for the model sites at Guesselbodi and Boyanga conducted by the model sites section of FLUP.

The two levels of mapping are cartographic units (CUs) and terrain units (TUs). Mapping the CUs for the five urban areas has been completed. Although few uses of these maps have been found so far, the concept appears to be useful. Other maps containing more useful local information could be overlaid on these CU - based maps so as to obtain a more complete picture. Mapping of TUs for the five urban areas is still on-going. The utility of this concept is still being evaluated.

The methodology used for fuelwood inventories in the five urban areas is seriously flawed. The critical problem has to do with the regression estimation, and the statistical analysis used to obtain the equation was also done incorrectly. It is recommended that fuelwood sampling schemes for the five urban areas that yield volume estimates for potential model site areas and for the total urban area making up these potential (and actual model sites) be developed using methodology similar to that used by the model sites project for Guesselbodi and Boyanga.

The stratified sampling with cluster sampling (mapping units/stratum) with subsampling (transact areas/mapping unit) used for fuelwood estimation by the model sites project is sound, particularly the latest version. The fundamental estimation equation underlying this approach is a linear relationship between stem fuelwood volume and either stem basal area near ground level (BA) or BA multiplied by the commercial height of the stem. The recommendation of this Team is to refine and generalize the sampling scheme used in Guesselbodi and Boyanga and train Nigeriens in the use of and implementation of the sampling scheme developed.

In conclusion, it is the consensus of the Evaluation Team that the FLUP Project should be continued. It is recommended that as an immediate course of action, the PACD should be extended a minimum of six months to June 30, 1988, to allow the existing Project Team the opportunity to finish their on-going work. It is also recommended that steps be undertaken to initiate the design of a second phase of this Project. For this purpose, it is considered essential that a design team be fielded and sent to Niger as early in 1988 as possible, in order to take advantage of the current Project Team's experience. Three options for the phase two project discussed with the Mission include: (a) a fully funded, stand alone A.I.D. project; (b) incorporation into a USAID agricultural project; or (c) a collaborative land-use planning project with other donors (e.g., FAO, UNDP, and GTZ).

## PREFACE

Adverse working Conditions in Niger make it difficult to obtain the services of qualified professionals for the long periods of time needed to make a long-term project succeed. Nonetheless, the FLUP Project has been able to make significant advances, and it is in a position to make important contributions to land-use planning in Niger and elsewhere in the Sahel, due in no small measure to the commitment of a dedicated group of professionals.

Nigerien professionals have participated to the fullest extent possible, and many of the technologies developed by the Project have been successfully transferred to the Nigeriens. Given the complex nature of land-use planning and related topics incorporated in the FLUP Project, however, follow-up action is needed by the Government of Niger, A.I.D. and other donors to assure that the momentum gained thus is not diminished or lost.

PROJECT DATA SHEET

1. Country: Niger
2. Project Title: Niger Forestry and Land-Use Planning Project
3. Project Number: 683-0230
4. Project Dates:
  - a. Project Authorized - - 12/31/79
  - b. Final Obligation Date - - 08/08/86 commodities and local costs  
- - 12/31/86 training and T A items
  - c. Most Recent PACD - - 12/31/87
5. Project Completion - Final Disbursement: Fiscal Year 1987
6. Project Funding:
  - a. AID Total (grant) US\$4,089,000
  - b. Other Donor (Peace Corps) 131,000
  - c. Host Country 99,000

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Total            \$4,319,000
7. Mode of Implementation:
  - a. Project agreement between USAID/Niger and GON, Ministry of Agriculture and the Environment, Directorate of Forests and Fauna (DDF), under the authority of the Minister of Rural Development (MDR).
  - b. A.I.D.-financed Local Contract Awards.
8. Responsible Mission Official During Life-of-Project:
  - a. Mission Directors: Jay R. Johnson, Herbert Miller (Acting), Ervin Rosenthal, John Lovaas (Acting), Peter Benedict, George Eaton
  - b. Project Officers: Daniel Stillman, Sidney Bliss, Patrick McDuffie, Dennis Panther.
9. Previous Evaluation: Mid-Term Evaluation -- May, 1983
10. Host Country Exchange Rates
  - a. Name of Currency: African Financial Community Franc (FCFA)
  - b. US \$1= FCFA 234 (1980).

GLOSSARY

Agency for International Development

ABS	- Annual Budget Submission
A.I.D./AFR	- Bureau for Africa
A.I.D./AFR/SWA	- Office of Sahel and West Africa Affairs
A.I.D./AFR/TR	- Office of Technical Resources
ASDG, ASDG II	- Agriculture Sector Development Grant, USAID Niger
CDSS	- Country Development Strategy Statement
COP	- Chief Of Party
CP	- Counterpart funds
CY	- Calendar Year
ECPR	- Executive Committee Program Review
FAA	- Foreign Assistance Act
FY	- Fiscal Year
NAAR	- Niger Applied Agriculture Research Project, USAID/Niger
NRM	- Natural Resources Management
NRMS	- Natural Resources Management Support Project, A.I.D./Washington
PACD	- Project Assistance Completion Date
PID	- Project Identification Document
PIO/T	- Project Implementation Order/Technical Services
PNRM	- Plan for Supporting Natural Resources Management in Sub-Saharan Africa

- PP - Project Paper
- REDSO/WA - Regional Economic Development Services  
Offices/West Africa
- SOW - Scope of Work
- TA - Technical Assistance

### Forestry and Land-Use Planning Project

- BA - Basal Area
- CDU - Classification Decimale Universell
- CP - Cover Percentage
- CU - Cartographic Unit
- FLUP (PUSF) - Forestry and Land - Use Planning Project  
(Projet d'Utilisation des Sols et  
Forests)
- FV - Forestry Value
- Pro AG - Project Agreement
- PSU - Primary Sampling Unit
- RIM - Resources Inventory and Monitoring  
Section, FLUP Project
- RIP - Revised Implementation Plan
- S/V/LF - Soil/Vegetation/Land Form base maps
- TU - Terrain Unit

### Government of Niger

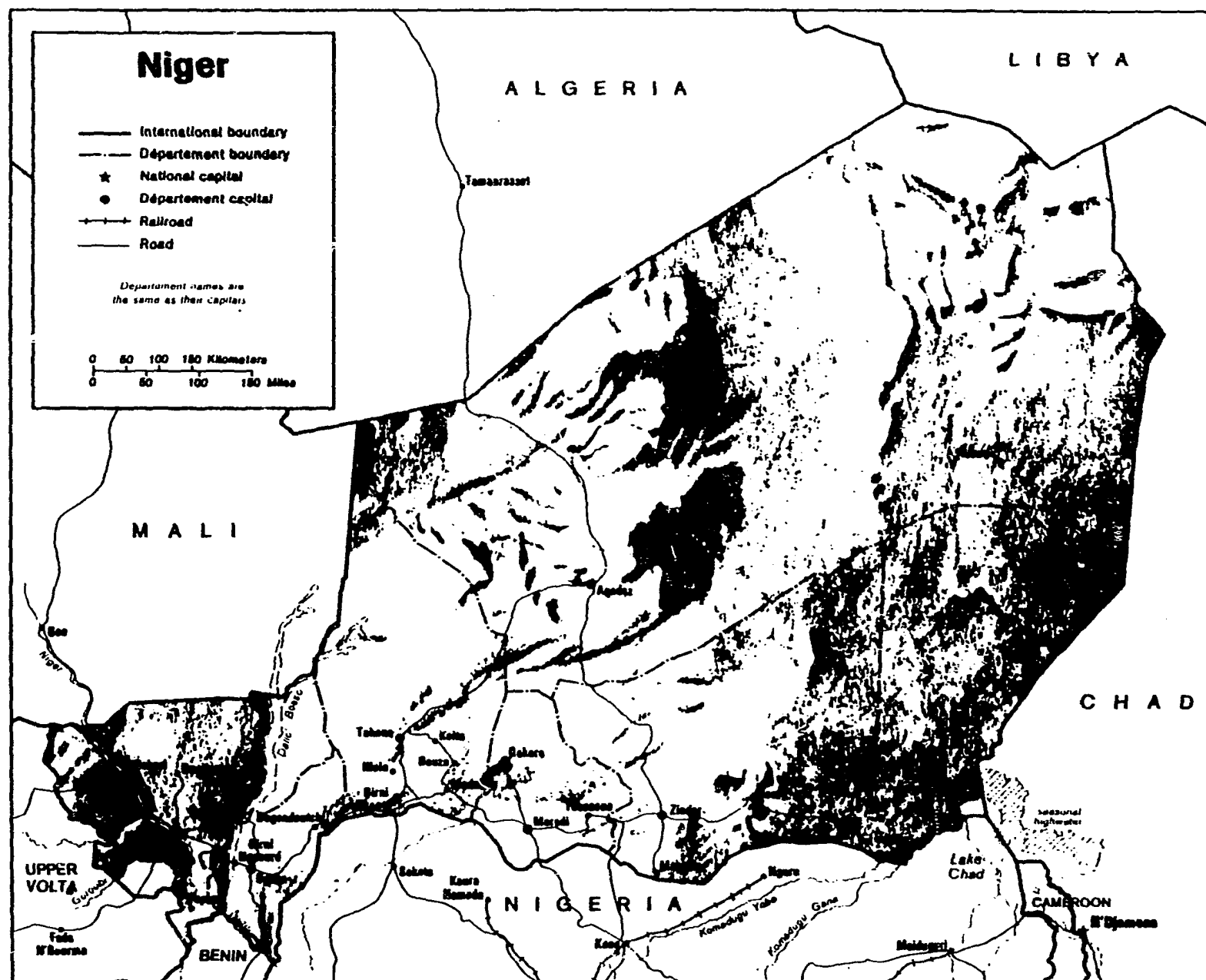
- DFF - Directorate of Forestry and Fauna  
(Direccion de Foret et de la Faune)
- FCFA - African Financial Community Franc
- GON - Government of Niger

- |          |   |
|----------|---|
| IGN      | - National Geographic Institute (Institut Geographique National)  |
| INRAN    | - National Agriculture Research Institute of Niger (Institute National de la Recherche Agronomique du Niger)  |
| MDR      | - Ministry of Rural Development (Minister de Development Rural)   |
| MHE      | - Ministry of Hydrology and Environment (Minister d' Hidrologique et de l'Environnement)  |
| SAFN/CPF | - Service of Natural Forest Management and the Commercialization of Forest Products (Service d l'Amanagement des Forets Naturelles et de la Comerclisation des Produits Forestiers) |
| SPD      | - Service of Planning and Documentation (service de la Plantification et de la Documentacion)   |

Other Donors

- |          |   |
|----------|---|
| CARE     | - Cooperative for American Relief Everywhere  |
| CILSS    | - Permanent Interstate Committee for Drought Control in the Sahel (Comite Permanent Inter - Etats de Lutte Contre la Secheresse dans le Sahel). |
| CLUSA    | - Cooperative League of the USA   |
| FAO      | - Food and Agriculture Organization of the UN.  |
| GTZ      | - German Agency for Technical Cooperation (Deutsche Gesellschaft fur Technishe Zusammenarbeit).   |
| IDA      | - International Development Association (World Bank).   |
| INCOFORE | - International Council for Forestry Research in Developing Countries.  |

- |         |   |
|---------|---|
| IUFRO   | - International Union of Forestry Research Organizations. |
| OECD    | - Organization for Economic Cooperation and Development.  |
| PAC     | - German CILSS Program (Programme Allemand CILSS).        |
| PVO     | - Private Voluntary Organization.                         |
| SPAAR   | - Special Program for African Agricultural Research.      |
| TFAP    | - Tropical Forestry Action Plan.                          |
| UN/UNDP | - United Nations/United Nations Development Program.      |



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## 1. INTRODUCTION

### 1.1 Project Description

#### 1.1.1 Project History:

The FLUP project was authorized on December 31, 1979, and the Project Grant Agreement was issued on July 1, 1980. Amendments to the Project Grant Agreement were issued on August 27, 1980, May 18, 1981 and August 16, 1983, and these were for the purpose of increasing project funding.

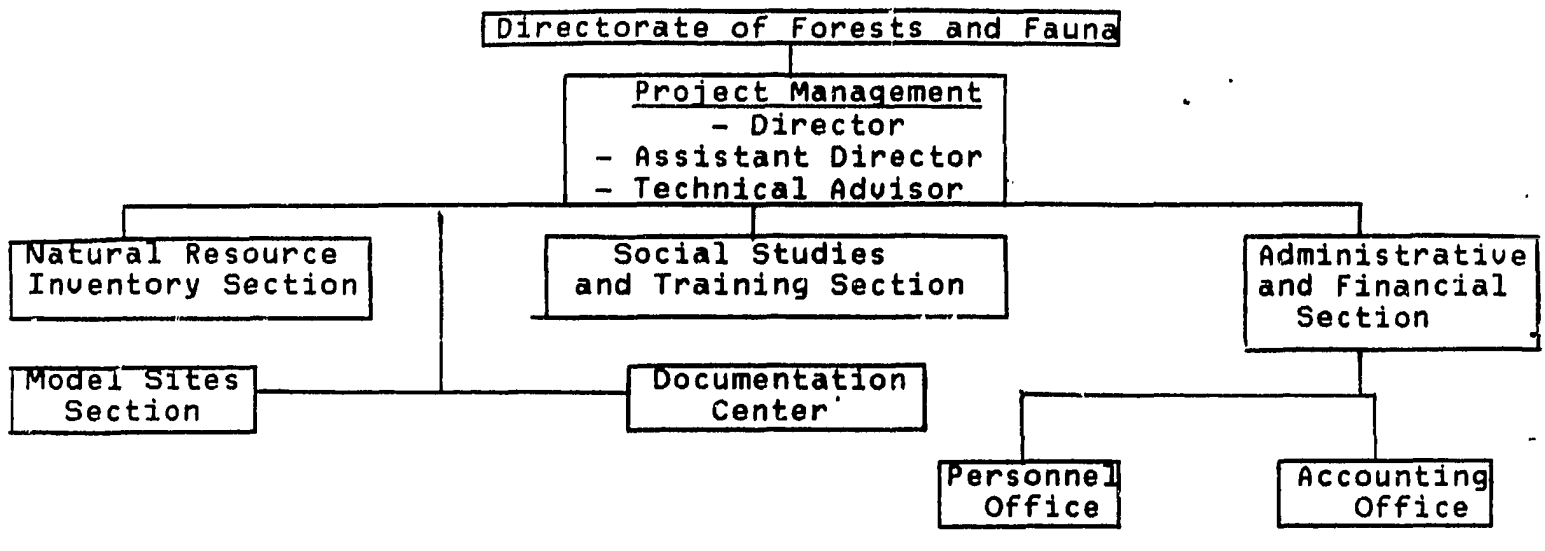
The project mid-term evaluation was conducted during May, 1983. The evaluation team found that "while the basic design and concept of the Project constituted a plausible, coherent and holistic approach to the situation of natural resources in Niger; there were major flaws in the dimensions of the activities and in the underlying assumptions on which Project design was based." Despite these problems, it was recommended that "with better definition of its tasks, strengthened personnel, and additional time and funding, the Project should be continued". As a result, a revised Implementation Plan was prepared, and a fourth Project Amendment was presented on April 30, 1984, which redefined the project objectives and redirected project funding.

The fifth Project Amendment, which was issued on August 8, 1986, increased project funding by an additional \$250,000 and changed the Project Assistance Completion Date (PACD) from December 31, 1986, to December 31, 1987. It also established as a "Condition Precedent to Subsequent Disbursement" the creation by "arrêté ministériel", the Strategic Planning and Coordination section within the DFF.

#### 1.1.2 Staffing (National and Consultants):

The Niger FLUP project consists of one Management Section and three technical sections including the National Resources Inventory Section, Social Studies and Training Section, and the Model Sites Section. In addition, there is a Documentation Center and an Administrative and Financial Section (Figure 1.1).

Figure 1.1 FLUP Project Structure



The Management Section consists of two DFF personnel and one expatriate technical advisor (AID contractor), and it is charged with assuring normal functioning of the Project within the technical, administrative, financial and associated areas.

The National Resources Inventory Section has a staff of seven professionals including two Peace Corps Volunteers and an expatriate photointerpretation and quantitative analysis advisor.

This group has the general objective of furnishing the most detailed information available concerning the existing natural resources (especially vegetation and soil), plus their distribution and their quality and quantity to formulate the best management methods for their conservation.

The Model Sites Section consists of four Nigerien professionals, two German volunteers, and two expatriate technical advisors. The principal objective of this section is to develop techniques for natural forest management and restoration of degraded land.

The Social Studies and Training Section activities were reduced to a minimum after 1984 due to the lack of qualified personnel.

The Documentation Center, staffed by a Peace Corps Volunteer, consists of a library having approximately 1,500 volumes that deal primarily with Sahelian forestry.

### 1.1.3 DFF Staffing

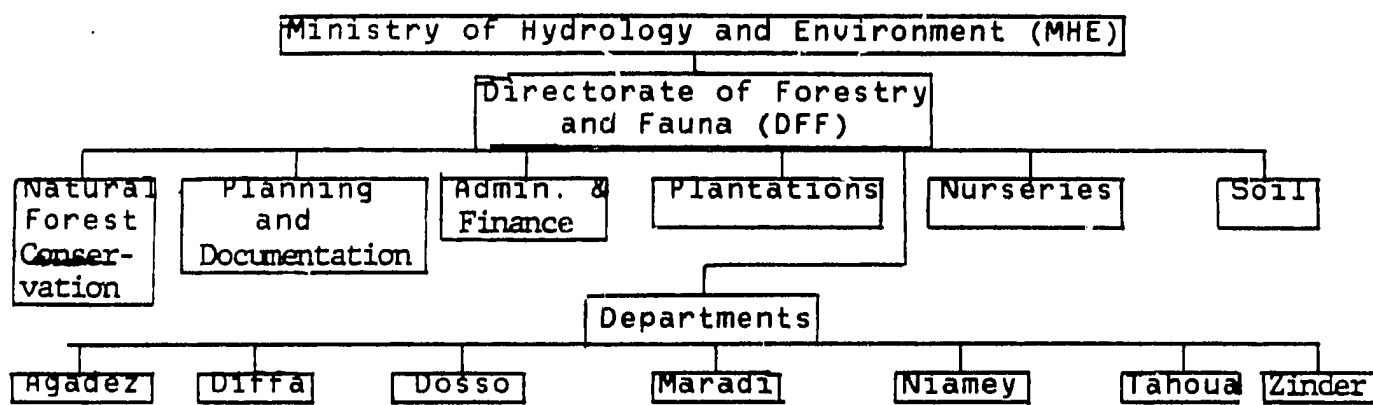
The structure of the DFF was developed in its current form during October, 1986 (Figure 1.2). The Planning and Documentation

Section was created at this time, and this is the group designated to undertake the forestry planning function by the FLUP project. In actuality, however, projects are under the direct purview of the Directorate of Forests and Fauna

The individual charged with managing FLUP for the Director is the head of the Natural Forest and Marketing Section.

The structure of forestry and wildlife units in the Departments is similar to that of the head office in Niamey. However, the Department units answer directly to the Prefet (head) of the Department. Consequently, FLUP activities need to be approved by the Prefects.

Figure 1.2. Structure of the Directorate of Forests and Fauna (Direction Forêts et Faune - D.F.F.) in the Republic of Niger.



#### 1.1.4 Budget Analysis

As mentioned in the Project History (Section 1.1.1), FLUP was authorized on December 31, 1979 for \$3,839,000 of grant funds (Table 1.1). An additional \$250,000 in grant funds were added to the Project on August 8, 1986, to facilitate extension of the PACD from December 31, 1986, to December 31, 1987.

Actual commitments as of June, 1987, total \$3,504,000 which leaves a total amount of \$585,000 in the pipeline. Analysis of pipeline funds shows that as of September, 1987, \$177,000 (i.e. \$119,000 for technical assistance, \$51,000 for training, and \$7,000 for commodities) remain uncommitted.

#### 1.2 Evaluation Methodology

The guidelines for this evaluation were derived from three principle documents, namely: (a) PIO/T No. 683-O230-3- which delineated the terms of reference for evaluation of the Forestry and

Land-Use Planning Project (FLUP) (No. 683-0230); (b) A.I.D. Evaluation Handbook (1987); and (c) A.I.D. Publication Style Guide (1984). The statement of work for the Evaluation Team - developed from PIO/T No. 683-0230-3- is shown in Appendix A.

A definitive schedule of activities, developed with the assistance of Mission and project staff, enabled the evaluation team to coordinate in-country activities during the three - week evaluation. Specific scopes of work derived for each team member provided further guidance. The team members and their specific tasks were:

- Dr. Carl M. Gallegos: Team Leader - provide guidance to the team on A.I.D. policy and assure completion of a report responsive to guidelines in the statement of work (Appendix A.);
- Dr. Kjell Christophersen: Forest Economist-review forest management, economics, planning, and institutional development aspects of the project;
- Mr. Michael McGahuey: Forestry Research Specialist-review model sites and forest management activities, as well as training, documentation and management issues. The Resource Inventory Specialist provided assistance to the Research Specialist in the areas of management and research design.
- Dr. Hans Schreuder: Resource Inventory Specialist-evaluate natural resource inventory issues and research design.

To facilitate the evaluation process, and to maximize Mission and GON input, the team conducted three briefing sessions at the start, mid-point and end of the three-week evaluation. The individual team members also produced three draft papers each concerning their findings in the specific areas assigned to allow for Mission and project staff critique and input.

At the behest of FLUP Project staff and their Nigerian counterparts, and with full concurrence of the Evaluation Team, three Nigeriens were added to the Team. These included Mr. Ide Bana, within the Planning and Documentation Unit of the DFF, Mr. Moussa Hasan of the Institut National de la Recherche Agronomique du Niger (INRAN), and Mr. Somalia Abdou of the Ministry of Planning, Environment Division.

The team also agreed that visits must be made to those areas in the field where project activities are being conducted. This allows for the first-hand study of the project environment and it facilitates a more comprehensive evaluation of accomplishments. Consequently, the Team was divided into sub-groups, and field trips were made to sites at Guesselbodi, Boyanga, Gorou Bassounga, Baban Rafi, and Tahoua.

TABLE 1.1.: Earmarked Funds and Expenditures for the FLUP Project as of June, 1987.

(1) Yearly budgets:

<u>Category</u>	FY80	FY81	FY82	FY83	FY84	FY85	FY86	FY87	Total
I. Technical Assistance	539	381	(Not Disaggregated)	356	741	(Not Disaggregated)	118	(Not Disaggregated)	
II. Training	90	0		141	187		0		
III. Commodities	287	0		40	143		0		
IV. Other Cost	183	275		256	261		122		
V. Contingency	<u>0</u>	<u>0</u>		<u>0</u>	<u>0</u>		<u>0</u>		
<u>Total</u>	1,099	576		793	1,332		240		

Total Project Budget (US\$ 000) = 4,040 + 49 Unearmarked = \$4,089

(2) Actual Commitments:

<u>Category</u>									
I. Technical assistance	494	279		335	527		56		
II. Training	90	0	(Not Disaggregated)	102	144	(Not Disaggregated)		(Not Disaggregated)	
III. Commodities	286	0		40	142		0		
IV. Others Costs	159	275		249	274				
V. Contingency	<u>0</u>	<u>0</u>		<u>0</u>	<u>0</u>		<u>52</u>		
<u>Total</u>	1,029	554		726	1087		108		

Total Actual Commitments (June, 1987) (US\$ 000) = \$3,504

Total Remaining (1) - (2) = \$585

### 1.3 External Factors

#### 1.3.1. Sahel

-- CILSS (Comité Permanent Inter-Etats de Lutte Contre la Sécheresse dans le Sahel) Club du Sahel Regional Anti-Desertification Strategy.

During January, 1985, the Council of Ministers of CILSS adopted the regional strategy to fight desertification in the Sahel. This strategy recommended the elaboration of the regional strategy for desertification control developed as a result of the regional seminar held in Nouakchott during October-November, 1984 (Rochette, 1985). The central objective of this regional strategy is to "achieve new socio-economic equilibrium based on two key points:

- Satisfying the fundamental needs of population groups and, in particular, food self reliance;
- Preserving the land and ecological capital supply and rehabilitating their productive potential."

#### 1.3.2. Government of Niger

##### --Engagement de Maradi

The "Engagement de Maradi sur la Lutte Contre la Desertification" took place in May, 1984, and the basis for this meeting was the strategy set forth in the CILSS "Regional Anti-desertification Strategy" (Ibid.). The Maradi meeting which resulted in a "Master Plan for the Fight Against Desertification in Niger" (1985), lists the fundamental characteristics of the causes, effects, and modes of environmental degradation. The Master Plan makes operational the ideas brought out in Maradi, and it creates a plan of action for all of Niger. This plan stipulates the following objectives: (a) assure food security; (b) satisfy energy needs, and (c) protect, restore and improve the environment.

This national Master Plan has served as the basis for developing national, regional and local land-use plans. It has also served as a guideline for coordinating the activities of various donor organizations, viz., the natural forest management projects of FAO/UNDP, GTZ, and World Bank in northern Niamey province (see section 1.3.2-- Other Donors). It is worthy to note that special reference is made to the FLUP Project and its objectives in the "Master Plan for the Fight Against Desertification in Niger".

##### -- Five-Year Economic and Social Development Plan of Niger

The current (1987-1991) Five-Year Plan for Niger (1987) defines the general policies for numerous sectors affecting economic and social aspects of the country. These policies are imposed on both the

private and public sectors for the ultimate purpose of carrying out action on the ground. Within the area of Forests, Wildlife, Fish and Pisciculture, the long-term orientation is as follows:

- restoration and preservation of the ecological equilibrium;
- satisfaction of population needs for wood (energy and wood products) and in basket products;
- wildlife management and protection;
- preservation and national exploitation of marine resources potential; and
- development of pisciculture.

The total budget planned for this sector over the next five years is FCFA 23.2 million, or four percent of the total government budget. This is allocated in the following manner: (a) 36.9 percent anti-desertification; (b) 40.6 percent forest products development; (c) 12.8 percent wildlife protection; and 9.7 percent fish and pisciculture. Specific objectives in forestry are to: (a) increase the number of central nurseries from 84 to 100; (b) increase the number of village (1,495 to 2,500) and school (100 to 476) nurseries; (c) reforest 5,985 ha; (d) establish 13,990 km of windbreaks; and (e) establish other natural forest management sites similar to Guesselbodi and Gaya.

#### --Inter-Ministerial Committee on Natural Resources

The Inter-Ministerial Committee on Natural Resources was created in June, 1987, for the essential role of conceiving and proposing to the government the fundamental orientation of a rational utilization and management policy for natural resources. The objective sought is the elaboration of a strategy for natural resources management in Niger.

The technical support committees are now being formed. These will focus on studying functional strategies and analyzing existing insufficiencies for the purpose of finding new perspectives concerning water, forest and soil resources.

The Inter-ministerial Committee is scheduled to meet during February, 1988, to analyze the different propositions put forth in each of the technical committee reports, to determine the status of preparation of the rural and water codes, and to bring up to date the forestry code and the mapping work.

At the present time, a permanent rural code secretariat is in place, and it is already functional. National and departmental groups have been formed to assist the secretariat in formulating the code.

## --Other Donors

The various donor organizations contacted in Niamey were knowledgeable about the FLUP Project, and they expressed a desire to see the Project continued. Given this interest, it is quite significant to note that FAO/UNDP and GTZ have initiated new projects based specifically on land-use planning principles and the Guesselbodi natural forest management model site developed by the FLUP Project. The World Bank and Canadian International Development Agency (CIDA) are to a lesser extent starting work based on the Guesselbodi model.

The "Aménagement et Reboisement Forestiers à Buts Multiples" Project, being designed by FAO, and jointly administered with UNDP, has the primary objective of protecting and providing erosion control for 20,000 ha of agricultural land and 600 ha of surrounding land, near Namaro, in northern Niamey department (FAO/UNDP, 1987). Specifically the Project is designed to address natural forest management, erosion control, dune stabilization, rural population participation, and technician training. The "Programme Global Niamey Nord", being prepared by the German GTZ and GON, is concerned with management of the total natural resource base-using land-use planning methods-for the northern Niamey province (Programme Allemand, CILSS, 1987). Both the FAO/UNDP and GTZ projects are designed to provide assistance for the GON to address the national plan for desertification control developed at the "Engagement de Maradi" (1984).

The World Bank "Projet Forestier" (Niger/IDA/FAC/CCCE) has a portion of its work that is focused on the management of "forêts non classées" in northern Niamey department using the Guesselbodi model. This project emphasizes the establishment of plantations (both irrigated and unirrigated) of exotic species, but these have been found not to be cost effective. Because of its cost effectiveness and acceptance by local people, the Evaluation Team was told that the World Bank intends to emphasize natural forest management in its future program.

### 1.3.3 USAID/Niger:

The AID/Niger Country Development Strategy Statement (CDSS) presents a "general direction of strategy and donor activities" in the natural resources sector (AID, 1986). This strategy - developed at the national level as a result of the continued deterioration of Niger's natural resources-concentrates on five major elements. These are: (a) a substantial improvement on the understanding of Niger's natural resources; (b) an aggressive program of natural forest resources management; (c) a strong reforestation program; (d) a major expansion of soil and water conservation efforts; and (e) a system of support structures to include training, research studies and planning support activities, and documentation. The Government

of Niger has compiled a summary of 53 new forestry-related projects in response to this strategy, but it is noted that no new projects are planned which include national forest surveys, nor are there any in the field of planning. The FLUP Project is the only one that addresses both these critical issues (A. Kinni and J. Sève, 1987), and it is the only project that has demonstrated successful natural forest management.

Despite this key position of the FLUP project, the Niger CDSS states that "because of limitations on direct hire personnel and operational expenses which constrain USAID's ability to manage projects, and the large number of donors implementing bilateral forestry and anti-desertification activities, USAID has decided to cease implementing bilateral projects in forestry and land-use planning." It is noted that the decision is made reluctantly because of the importance of land-use planning in drought proofing, reclamation of fragile lands, increasing agricultural productivity, and diversifying the rural income base.

#### 1.3.4 A.I.D./Washington

##### -- CDSS Guidance

The "Niger FY: 1988 CDSS: Executive Committee Program Review (ECPR) Reporting and Decision Cable" (State 144217, 1986) provided specific guidance to the Mission regarding the FLUP project. Reference was made to funding uncertainties and the likely effect this would have on all A.I.D. programs in the mean-term. It was also noted that in both agriculture and health the Missions priority will be to reduce funding levels across the board, with some preference that agriculture should sustain lower cuts.

In this context, it was noted that the Mission's approach to drought presents a convincing case for refocusing activities in the agricultural area in such a way as to help the country to be better prepared to respond to drought situations in the future. Technologies developed under the FLUP Project and the Early Warning System of the Livestock Project will be folded into ongoing GON programs as these two projects terminate.

##### -- Other Events

- Several things have occurred in Washington, D.C., and the world since the USAID/Niger 1988 CDSS presentation that will likely have an effect on the implementation of forestry and natural resource strategies by the Agency. In Washington, D.C., this includes: (a) legislation that was passed concerning "Protecting Tropical Forests and Biological Diversity in Developing Countries;" (b) the A.I.D. guidance on environment and natural resources that resulted from this legislation; (c) approval of the Africa Bureau Plan for Supporting Natural Resources Management in Sub-Saharan Africa

(PNRM) and the resulting Natural Resources Management Support Project (NRMS); and (d) the new Agency Agriculture focus. In the international arena, the following activities have been initiated: (a) the FAO - World Resources Institute/World Bank/UNDP co-sponsored Tropical Forestry Action Plan (TFAP); and (b) the International Union of Forest Research Organization's (IUFRO) initiative to establish an international forestry research network.

-- The PNRM initiative sets forth the Africa Bureau's basic strategy for addressing environmental degradation in Africa. This consists of four thrusts which are: (a) to respond to the problem of environmental degradation in Africa with a holistic view supportive of the rational utilization and management of resources; (b) to integrate to the extent possible, natural resource management with agricultural development; (c) to continue to focus program attention on the basic causes of environmental degradation; and (d) to support, where necessary, specific activities aimed directly at natural resource management concerns. The PNRM designates the arid - semi - arid zone and the tropical highlands as the two agroecological zones being immediate target areas. To establish priorities in the above activities, the PNRM divides A.I.D. assisted sub-Saharan African countries into three groups. These groups represent a continuum with priority programs in Group I countries, specific but limited-focus activities in Group II countries, and very restricted, if any interventions, in Group III. Niger is in Group I - focused programs - along with Guinea, Senegal/Gambia, Madagascar, Mali, Rwanda, Somalia, and Sudan.

- The NRMS Project is the Africa Bureau's vehicle for fostering implementation of the PNRM (AID/AFR, 1987). The project goal is to improve policies and programs to restore and maintain environmental stability and the natural resources base in sub-Saharan Africa, especially in support of agriculture. The project purpose is to increase the quality and level of natural resources management activity in A.I.D.'s country and related regional programs in Sub-Saharan Africa, and in Private Voluntary Organization (PVO) programs supported by A.I.D. The project addresses the goal and purpose by: (a) assisting Missions to conduct natural resources management (NRM) program assessments; (b) providing Missions with consulting and evaluating NRM projects; (c) sponsoring and funding special studies to assist the Bureau, REDSOs, and Missions in their NRM programming and implementation; (d) publishing a newsletter and examining Mission and REDSO information needs in NRM; (e) helping PVOs strengthen their capabilities in NRM through training, technical assistance, and information support; (f) providing support for biological diversity; and (g) on a one-time basis, providing remote sensing equipment to Ivory Coast for NRM-related purposes.

- The New Agriculture Focus that is currently being develop in A.I.D/W is aimed at increasing the incomes of the poor majority, and expanding the availability and consumption of food, while maintaining and enhancing the natural resource base. The natural resource base referred in the new focus includes those natural resources used or impacted by agriculture in its broadest sense, including fisheries and forestry production. Maintaining this resource connotes holding steady, preventing loss or degradation, and retaining productivity. Enhancing the resources base means improving it quantitatively or qualitatively to achieve a sustainable agriculture and human settlement.

#### 1.4 Inputs

The inputs originally planned for the Project include the following categories: personnel, training, commodities, construction, land, and other. GON personnel contributions were 59 person years of high-, mid-, and low-level full time people. A.I.D. contributed four person years long-term and four person years short-term assistance, and Peace Corps added six person years of long-term volunteer service. Training inputs involved long-term academic training in the US and a third country, as well as in-country training and extension. Commodities supplied by the project included various things such as vehicles, survey equipment, office furnishing, satellite/aerial photography, and tree seedlings. Construction of office buildings was undertaken by the GON. Land for the model sites was contributed by the GON.

Inputs specified in the Revised Implementation Plan (RIP) include technical assistance, training and commodities. Technical assistance provided by USAID is a total of 238 person months of long - and short - term assistance including an arid zone forester, a resource inventory specialist, an economist/planner, rural sociologist, and short-term consultants. A total of 199 person months in academic training is planned. Study tours and conferences are also to be undertaken. Commodities supplied include vehicles, forestry equipment, documentation, micro-computer supplies, aerial photos/satellite imagery, and fencing materials.

#### 1.5 Outputs:

The original objectives of the Niger FLUP Project were to be accomplished primarily through the: (a) establishment of a Technical Planning Unit (Bureau Technique Forestier-BTF) within the DFF; (b) establishment of a natural resources data base; (c) establishment of model sites; and (d) mobilisation of human resources within the Technical Planning Unit. The planned output was one fully staffed and equipped unit operating out of its own facilities. The Natural Resources Inventory Group aimed to carry out field surveys (one model site per year) and to acquire aerial photography, satellite imagery, vegetation maps, and documentation

for this purpose. The Model Sites unit proposed to complete a minimum of seven production and nine conservation forest management sites (16 country-wide) in four years. Human resources development objectives within the DFF consisted of long-term training (four individuals) in-service training, and on-the-job training. In other GON services and agencies, one-day seminars, publications, and field visits by key officials were planned. Other activities included mass media communications, extension, and public relations.

As a result of the RIP, the chief output of the project, to which each project component will individually and collectively contribute, is the development of a well organized and functional planning unit in the DFF. Specifically, this will provide the DFF with capability for: (a) consistent and rational data collection and analyses; (b) evaluating project proposals; (c) integrating the Government of Niger's (GON) natural resources planning and management with other GON development activities; and (d) improving the GON's dialogue and gaining active support of Niger's rural population.

The Forestry Planning Unit component (SPD) serves as the umbrella organization, and directly utilizes the outputs of the other project components (national resources inventory, inventory of forest reserves, national forest management, and extension/social survey) in carrying out its tasks. The SPD will be composed of four sections which are: (a) planning and programming; (b) project appraisal and monitoring; (c) studies and statistics; and (d) documentation. Specific activities of the Planning and Programming section are to produce a forestry sector analysis model to allow the SPD to carry out rational planning and allocation of resources. In addition, the planning section should define, in collaboration with the other sections, level of inventory data needed to facilitate land use planning, establish criteria for the selection of model sites, and organize forest economics and planning seminars. The Project Appraisal and Monitoring section will develop a forestry project monitoring methodology and participate in monitoring the Majjia Valley Windbreak project. The Studies and Statistics section will undertake marketing studies concerning fuelwood and other forest products, conduct prefeasibility and feasibility studies for potential projects, review problems related to conversion of forest land to agriculture, and prepare the term of reference for other economic or technical studies. The Documentation Center is charged with preparing a management information system and organizing a small library.

The National Resources Inventory component will give priority attention to an inventory of forest and brush resources located near Niger's five major urban centers, and provide SPD with baseline data needed for planning. The Urban fuelwood section will complete the 100 km radii urban fuelwood inventory for Niamey, Dosso, Tahoua, Maradi, and Zinder. In addition, the Inventory component is charged

with strengthening cooperation with the Soils Laboratory (LABOSOL), and it will develop criteria for siting future forestry development.

The Inventory of Forest Reserve component involves the development of simple inventory and mapping techniques to improve the collection of data and information on natural resources, plus conduct courses needed to undertake the inventories. The Demonstration and Training in Natural Forest Management Component will produce a brochure and guide to the Guesselbodi, plus develop project siting criteria, select a third model site within the Niamey circle, and conduct a forestry tour to a neighboring Sahelian country.

The objective of the Extension/Social survey component is to provide baseline data to the SPD on actual utilization of forest and brush products and soils. In addition, this component will conduct data analysis of previous work, develop future data collection plans, identify future model sites, conduct seminars, and undertake extension of activities.

#### 1.6 Goal:

The original goal of the Niger FLUP Project was to arrest and reverse the existing trends in deterioration of Niger's soil and vegetative resources. Ultimately this will assist Niger to attain food self-sufficiency and sustained economic growth in rural areas.

The 1984 Revised Implementation Plan (RIP) reiterated the long-term sector goal as being that of enhancing environmental stability in support of agricultural productivity.

#### 1.7 Purpose:

The Niger FLUP Project purpose - as stated originally in the PP - is to establish a functional planning and managerial capability within Niger's Forest and Water Service (now the Direction de Forêt et la Faune-DFF). In addition, the Project is to produce a long-term perspective plan for the protection of Niger's soil and vegetative resources; and increase the awareness of Niger's rural population and government service personnel on the need for resource conservation.

As a result of the RIP, the Project orientation shifted from development of an overall resources planning unit having as its principal task the preparation of a 20 year comprehensive rehabilitation plan to develop the planning capability required to meet the short-and medium-term needs of the Direction de Forêts et la Faune (DFF). The purpose of the revised Project is, therefore, to improve and strengthen the planning process within DFF, and to institutionalize that process by developing the effective planning unit within the DFF; thereby improving its ability to identify problems, opportunities and solutions and accordingly to program human, financial, and operational resources.

The specific objectives of the project are now: (a) creation and establishment of a planning unit within the DFF; (b) development of cost effective methodologies for collecting data and training staff on data analysis; (c) generate the requisite information for sector assessment and planning; and (d) preparation of increasingly more detailed plans to facilitate decision-making in the DFF.

The intermediate objectives are to: (a) institutionalize the planning unit in the DFF; (b) devise methodologies for and carry out basic natural resources forest inventory work; (c) develop test, demonstrate, and train staff in technology needed to respond to natural resource problems; and (d) study and analyze local people preferences to guide and assist the extension efforts of DFF.

### 1.8 Beneficiaries:

The FLUP project is viewed as a first step in a chain of actions intended to have an ultimate but direct effect on the whole of the country and its people. The more immediate, direct beneficiaries are people living near model sites. As feedback from the rural population is obtained, additional model sites will be selected for management, and lessons learned will be passed on to, and will benefit, an increasingly larger group of rural people.

It is expected that the Project will have a spread effect within the DFF and the MHE. The Planning and Coordination Section (SPD) within the DFF is expected to become a focal point for coordinating all GON efforts related to the protection and conservation of natural resources. As such, the SPD should impact on activities of the Ministry of Planning, Ministry of Agriculture, Livestock Service Ministry of Rural Development, and the Ministry of Research and Planning.

### 1.9 Unplanned Effects

This section--and the following section concerning Lessons Learned--specifically address questions delineated in the Statement of Work (Appendix A) pertaining to the relevance, efficiency, effectiveness, impact, and sustainability of FLUP Project activities. The fundamental aspects of this Project which affected the response to all these questions were first the long-term nature of the Project; and second the tremendous void which existed between complex land-use planning concepts and the level of technical knowledge in Niger regarding these ideas. These concepts, which are second nature to professionals in the U.S. and other developed countries, are based on knowledge which has evolved over many years. This knowledge base was essentially absent in Niger, and it is significant that FLUP was able to bridge this gap in seven years.

- 1.9.1 Peace Corps has played a significant role in Project execution. There are volunteers located at the FLUP head-quarters in Niamey, and they contribute significantly

to statistical modeling and compilation of documents. In the field, the Volunteers have been crucial in the extension of project methodologies, activation of cooperatives, and serving the valuable role of being "a person in the field".

- 1.9.2 Other Private Voluntary Organizations, such as the German Volunteer Service, have embraced the land-use planning and natural forest management concepts, and they have assigned Volunteers to work at Project field sites. There are presently two Volunteers assigned to Tahoua and Guesselbodi, and plans are underway to bring in two more people to work with FLUP.
- 1.9.3 Other donors have also embraced FLUP Project concepts (See section 1.3.2), and they are designing projects based on FLUP mapping and the Guesselbodi model. The donors have also recognized the need for incorporating formal land-use planning concepts in project design and implementation.
- 1.9.4 Farmers have become pro-active participants in the application of land-use planning in the field. They have seen the value of land rehabilitation, and they are actively establishing erosion control structures, planting trees, and protecting areas designated under management plans. Farmers are also realizing financial gains from controlled fuelwood cuts, and they are motivated to manage the resource for sustained yield.
- 1.10 Lessons Learned (not in order of priority)
  - 1.10.1 It is difficult to grasp and implement a complex concept like land-use planning, and this is particularly accentuated in the physical, educational and political environment of Niger. The value of planning concepts in developing country projects, and in particular the implementation of these concepts in Niger, demonstrate that projects of this nature must be long-term. For example, the FLUP Project was not well developed by the fifth year and it was nearly cancelled. It has only been in the last couple of years that its potential has become manifest to a general audience. Ten years is a reasonable commitment for natural resource projects.
  - 1.10.2 The disaggregation of forestry, agriculture, and livestock is illogical, especially in Niger where farmers have been using both technologies to devise systems that are crucial to survival in the Sahel environment.
  - 1.10.3 Technology is driving policy with respect to the implementation of land-use planning, and this is graphically demonstrated at Guesselbodi. The policy decision by the GON to share stewardship of Guesselbodi with the Woodcutters' Association was achieved seven years after the FLUP project was initiated. During this time the DFF was able to demonstrate to the GON that the cooperative agreement made economic and ecological sense.

- 1.10.4 Counterparts are under-trained for the work expected of them. Training must be started earlier; there must be more training; and a conscientious attempt must be made to build confidence in the people designated to be counterparts.
- 1.10.5 This Project has again demonstrated the value of the grass-roots approach, and the importance of grass-roots support in making most natural resources efforts work.
- 1.10.6 Continuity is essential for the success of a long-term project. Consequently, such a project must be institutionalized from the outset to assure that project goals and purposes become an integral part of long-term, host country government plans, and that individuals are trained to carry on work after the project ends. In addition, GON personnel trained in the Project should not be moved to other projects or duties.
- 1.10.7 The Guesselbodi and Gaya experiences have confirmed the value of model sites for demonstration purposes. An appropriate role for donors would be to support these, and other model sites, until they are cost effective and attain self sufficiency.
- 1.10.8 Land-use planning concepts have been used to develop natural resource development programs for the Sahel and Niger (See Section 1.3.1 and 1.3.2). However, the in-depth knowledge concerning the environment and natural resource base needed to implement these programs is lacking for a majority of the Sahelian countries. "Country Environmental Profiles" being undertaken by A.I.D. and other donors for many of the developing countries should be done for these countries to fill this void, and in the case of Niger, the draft environmental profile (AID, 1985) should be completed.
- 1.10.9 The original recommendation made in the RIP to make the Project Management Technical Advisor/Planner Chief of Party for the expatriate team should have been implemented. The expatriate contractors appeared to be working independently of each other owing to a lack of coordination at that level. To facilitate future project work, there must be definite coordination of project contractor (e.g. FLUP) either through the designation of a Chief of Party, or through contracting the project to a single contractor that is charged with forming a team and supervising individual team members activities.
- 1.10.10 The experience at Gaya demonstrates that farmers are capable of making wise choices to carry out land restoration and to enhance productivity. It is significant that natural forest management and enrichment planting have been selected over plantation establishment.

1.10.11 Success of the FLUP Project at Guesselbodi suggests that it is possible to make advancements in sociological and cultural aspects of cooperative establishment and operation with the participation of sociologists and/or cultural anthropologists. The fact is that Dr. James Thomson and other professionals in these disciplines played a significant role in the RIP, as well as earlier phases of the Project, and their contributions did in fact provide background for the eventual successful establishment of the Guesselbodi and Boyanga Cooperatives. If the decision is made to initiate a second phase of the project, it is considered essential that sociological input be designed into the new project to assure successful dissemination of the Guesselbodi cooperative model and to provide additional technical input into other aspects of the project.

1.10.12 The suggestion made in the 1983 evaluation that the number of Model Sites be reduced to three had a major impact on the present status of FLUP. It is better to focus resources on a limited number of sites and develop viable models than to target a large number of farmers as recipients of particular untried interventions.

## 2. ECONOMICS/SOCIOLOGY AND POLICY

### 2.1 Introduction and Summary

This chapter evaluates the performance of the Forest and Land Use Planning Project (FLUP) from the economics, sociological and policy perspectives. The scope-of-work (SOW) is given in Appendix 1 and in the subsections below in the form of specific questions posed by the FLUP team and USAID. There are two basic issue categories considered--planning and management issues. The chapter also presents a rough estimate of the recurrent cost implications associated with the Service de la Planification et de la Documentation (SPD). Recommendations are given at the end of the chapter.

In summary, it is emphasized that the FLUP project, particularly the model site component, should be considered a technical success despite the problems of delays in meeting project objectives and deviations from original and/or revised implementation schedules. The project has addressed extremely complex issues where the technical solutions are never straight forward or simplistic. That one has seen less than perfect execution of the workplans and failure to meet certain objectives, may be partly attributable to the fact that basic and entrenched land and forest resource use attitudes and opinions of both the donor community and the GON had to be changed before any significant impact from the project could be expected.

Niger, as most countries in the Sahel region, has gone through a generation of donor financed projects which emphasized exotic fuelwood plantations, generally by way of the top-down government-to-government approach. The people on the lower end of the scale--the villagers and herders did rarely, if ever, participate in the planning and implementation of these activities. One major impact of the FLUP project has been to foster, through the model sites, a much more pragmatic approach to land use planning taking into account that local participation is essential. It is only now, after this lengthy period of learning and adjusting, that real fruits begin to emerge.

There are indeed valuable lessons to be learned from the FLUP experience for other donors and, above all, for other A.I.D. missions in the Sahel regions. The most significant lesson learned from the project comes from the model site experiments--that recurrent costs from natural forest management, through the local participation/cooperative approach--can be covered under sustained yield management. It is important to note that these recurrent cost surpluses are derived mostly from the sale of hay and not only from the fuelwood values.

The planning issues of concern to USAID in this evaluation focus on the creation and functioning of the Service de la Planification et de Documentation (SPD). Although the condition precedent that the planning unit be created has been met, its ability to function as originally intended is still far off. It is a planning unit essentially without tools, staffing and a clear mandate or direction at present. The tools--how-to methodologies and techniques--are being developed by the technical assistants as they become available. As discussed below, there are indeed problems with the transfer of technologies from the technical assistants to the SPD, but there are also solutions. The important fact, as far as the project is concerned, is that the SPD exists, albeit only in a stage of infancy.

The SOW for the evaluation team concerning the planning issues is specific. This chapter addresses this SOW and evaluates how the FLUP project has performed with reference to how it should have performed according to the project 1984 redesign. The team feels it is important to point out, however, that the basic idea of a compartmentalized planning unit may, in retrospect, not have been the best solution, according to the A.I.D. Project Manager. Although planning should still be vigorously pursued, a more decentralized, integrated system of planning within the Forest Service instead of a separate planning unit might have worked better. Consideration of this alternative approach to planning was not part of the team's SOW. If the FLUP project is to continue in a second phase, however, this alternative approach to planning, among others, should be considered in the project design.

The management issues of concern to USAID focus on the functional and operational relationships between the technical assistants and their counterparts, the project and AID, and on project finances.

Concerning the counterparts, the situation could be much improved. Although the DFF has assigned counterparts to the project, none, with the exception of the Project Director and the SPD Director, occupy positions with any real decision-making responsibility or authority. Their level of formal education is far too low to allow them the opportunity to really influence and guide the decision-making and planning processes in the future, regardless of how capable and motivated they may be as counterparts today. At this late stage in the project, it would be unrealistic to require that new counterparts be assigned. The present ones should continue and the technical assistants should make every effort to include them in all phases and at all levels of the project. In addition, however, it should be insisted that the Division Chief level of SPD be assigned with people who hold at least the equivalent of MS degrees; and, that the present counterparts be assigned directly to the Division Chiefs.

The relationships between the project and A.I.D., and between the technical assistants and the Project Director could also be improved. A major part of the problem is rooted in the absence of a team leader, someone representing the technical assistants vis-a-vis A.I.D. and, more importantly, vis-a-vis the Project Director. Because there is no official team leader, there is little coordination between the individual team members. This is - in part - attributable to the piecemeal build up of technical assistance during the course of the project and the late arrival of the Technical Advisor/Planner. Following the 1984 project redesign, A.I.D. attempted to but did not succeed in making the Technical Advisor/Planner the team leader and coordinator of the technical assistance team. Because of this unsuccessful attempt to act on a key recommendation in the 1984 redesign, the effectiveness of the project has been greatly diminished in the opinion of the evaluation team.

The overall recommendation of the evaluation team is that the project should be extended for the purpose of achieving the original project objectives. While the "learning curve" may have seemed flat for a long time, it has now at least reached the "point of inflection". With some additional time, and a change in focus, A.I.D. stands to reap substantial returns on the investments made in the FLUP Project in terms of lessons learned and Agency wide directions for future natural resource development projects. The lessons learned are indeed widely applicable to other donors, to governments in the Sahel region, and to other A.I.D. missions.

## 2.2 Questions Concerning Planning Issues

### 2.2.1 Service de la Planification et de la Documentation (SPD)

-- To what extent does the planning unit's organization and implementation plan satisfy the Fourth Amendment? Have there been any major changes, and if so, are they justified?

The Fourth Amendment to the Grant Project Agreement reads that the project "...is designed to provide assistance to the Government of Niger to strengthen the planning and managerial capability of the Direction de Foret et Faune (DFF) of the Ministry of Water Resources and Environment"

In the form of a short answer to the question above, the planning unit's organization and implementation plan satisfy the Fourth Amendment of the Project Grant Agreement only on paper. While the planning unit and the implementation plan both exist, they are not fully functional.

The SPD was established in October, 1986, nearly one year behind schedule. The overall purpose of the SPD is, with technical assistance from the FLUP project, to foster the development of a competent capability within the Forest Service for planning in the

natural resources and forestry sectors. Its major role is to assemble, analyze, generate, and disseminate relevant information to be used to establish land use priorities and strategies which, in turn, lead to integrated land use plans. It was designed to be the analytical arm of the Forest Service with a mandate to provide more in-depth and coordinated planning and analyses of ongoing and proposed projects.

The document entitled "Plan d'Organisation et d'Execution du Bureau Technique Forestier (BTF)", based on the Fourth Amendment, lays out the organization of the SPD<sup>(1)</sup>, implementation schedules, work descriptions, materials needs and detailed budgets for the functioning of the SPD. It was understood, in this basic document, that the working relationship between FLUP and SPD should be close and on a day-to-day basis. Since the creation of the SPD, however, collaboration with the FLUP project has been almost non-existent. The SPD is located in the Forest Service offices, physically apart from the project office, and all communication between the SPD and the project, if any, must pass through the Project Director. There is no direct, day-to-day communication. The counterpart to the Technical Advisor/team leader (unofficial) is (de facto) the Project Director, not the SPD Director.

The activities and strategies listed in the Plan d'Organisation are well conceived and carefully thought out. However, none of the planning activities have been completed on schedule (the majority have not even started) because: (a) the SPD is not staffed, (b) there is no counterpart relationship between the SPD and the project and (c) the Technical Advisor/Planner is assigned project administrative functions. The objective of FLUP was amended twice during the life of the project. In 1984, a strategic planning component was added, and in 1986 a reorganization of the DFF was mandated and done using the Plan d'Organisation. The analytical planning service (SPD) was not staffed, however, due to an overall lack of qualified individuals. The Project's latest revised output is, therefore, that all technical assistance inputs (model sites, inventory, sociological surveys, documentation) ultimately feed into and strengthen the SPD. This intent is still valid, but it cannot be accomplished because the SPD, though it exists on paper, has little to do with the project. One major flaw is that the counterparts to the technical assistants are not attached to the SPD. Thus, the transfer of technology as intended by the project is not taking place. The technical assistants should be working on a daily basis with counterparts from the SPD, not just any counterparts, to strengthen the technical and planning capabilities of the DFF. Presently, the methodologies, analytical techniques and

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(1) The Bureau Technique Forestier (BTF) was the original name given to the planning unit. It was since changed to Service de la Planification et de la Documentation (SPD).

procedures being developed and perfected by the technical assistants and their counterparts, are at best passed on to the SPD in the form of reports and studies. They should instead be passed on in the form of trained cadres capable of carrying on without continued dependence on external support and guidance. Steps should be taken now to ensure that the present counterparts be eventually made part of the SPD.

The SPD Director presently has a staff of two people, both foresters in the central office. In addition, SPD will (when functioning) receive planning assistance from the "cellules departementales", recently established in four districts throughout the country. In each district, one person has been assigned to work in a planning capacity as counterparts to Peace Corps Volunteers through the auspices of the FLUP project. While this arrangement was not specified in the Plan d'Organisation, the addition of the regional, field perspective to the planning process should prove to be very useful.

According to the Plan d'Organisation, the SPD central office should be staffed as follows:

- Chef de Service--presently occupied by MS level forester/planner
- Chef de Division Suivi et Coordination--presently occupied by BS level forester
- Chef de Division Planification et Strategie--vacant
- Chef de Division Documentation--presently occupied by HS level forester
- Chef de Division Inventaire et des Ressources--vacant

There is no effort underway, on the part of the GON, to fill the vacant positions, nor to ensure that the positions under each of the division heads also be filled. Further, it should be noted that the Division Chief level positions now occupied by people with the equivalent of BS and HS degrees, should instead be occupied by people holding at least the equivalent of MS degrees.

Although the establishment of the SPD was, in itself, a major hurdle, the most important work still remains. It needs to be provided with the necessary tools, appropriate staffing, and above all, recognition by the actors in the forestry and land use sectors (ministries, donors etc.) as the most important institution in charge of setting priorities and detailed planning of forestry and natural resources projects. Further, the foundation must be laid now to ensure that the SPD be adequately funded to be able to function as envisioned, without total reliance on external support.

Because it is in a stage of infancy, and because the PACD is rapidly approaching, SPD will have to depend heavily on the technical support of the project to acquire the necessary expertise, technical tools and guidance that will allow it to function as envisioned. If the project ends in December, 1987, however, it is highly probable that SPD will never function as originally intended. If the PACD is extended to June, 1988, as has already been proposed by AID, there may be time to firmly establish the links between SPD, the other services in DFF, and the project, so that all project outputs are henceforth coordinated and channeled into the SPD.

It is important to note that the Environment portion of the Ministry of Water, and Resources and Environment was absorbed into the Ministry of Agriculture on Sept. 8, 1987, while the evaluation team was in the field. This change in the government structure may provide an excellent opportunity to resolve the problems associated with the SPD just discussed and thus set the stage for a successful conclusion of all project activities.

-- To what extent does the reorganization of the Forest Service, the assignments of personnel and the planning unit's implementation plan satisfy the conditions precedent set out in the Fifth Amendment?

The conditions precedent relating to reorganization of the Forest Service as stated in the Fifth Amendment are as follows:

- Creation of the SPD under the direction of DFF
- Preparation of detailed work plan for the SPD
- The adoption of a staffing plan

The short answer to the question above is a highly qualified yes. The conditions precedent have been met--the SPD, the workplans and the staffing plans all exist--the problem is that the SPD is not functioning, and therefore, the workplans are not being implemented and the staffing plans are not acted upon (see above).

The extent to which the reorganization of the Forest Service satisfies these conditions precedent remains to be seen. SPD will ideally function once the office is adequately staffed by competent individuals with the necessary academic credentials in addition to the training they are supposed to receive from the project technical assistants. Further, there is much work to be done to achieve recognition by other donors and the GON of the importance of the SPD as the key planning unit in forestry and natural resource land use projects, both ongoing and proposed.

With the new Service de l'Amenagement des Forets Naturelles et de la Commercialisation des Produits Forestiers, active forest management in Niger has become institutionalized. Forest management

until now had consisted largely of the protection (as opposed to forms of exploitation) of the forest resources. The establishment of this Service is, in and of itself, a visible and important recognition of natural forest management as a viable land use alternative. A second visible impact, and an unexpected benefit, is the Peace Corps natural forest management initiatives which have been set in motion as a result of the project. These are indeed important impacts of the FLUP project.

The long term effectiveness of this new service, however, remains to be seen. It will depend largely on the extent to which the results and methodologies of the FLUP model site studies and lessons learned from other natural forest management projects (World Bank, UNDP/FAO, GTZ, and others) are analyzed by the SPD and then absorbed and institutionalized over time.

-- How functional and how effective are the working relationships between the "Service de la Planification et de la Documentation" (SPD) and the Project?

As discussed in greater detail above, there is now no direct relationship, nor any official lines of communication between the SPD and the project. The technical assistants are supposed to serve a major technical function in developing and providing the necessary analytical tools and methodologies for and collaboration with the SPD without which the SPD will be ill equipped to function in the future. However, because there is no official lines of communication between the SPD and the project, the transfer of technology through the SPD as intended, is not functioning.

-- To what extent will the SPD be able to perform its duties without external support?

SPD's ability to perform its duties without external support must be assessed with reference to its anticipated (and prescribed) levels of staffing and responsibilities. If the funding for office space, furniture, vehicles, computers, salaries and other operating costs must come from the national budget, the probability is low that the SPD will be able function as envisioned. If, on the other hand, the SPD receives all the infrastructure procured by the project, only the recurrent costs will have to be covered through the national budget. The evaluation team cannot comment on whether the GON is prepared to cover these recurrent costs.

A very rough estimate of the recurrent cost requirements over the next 10 years, assuming that SPD inherits all project procured infrastructure and materials, is presented in section 2.4 below.

## 2.2.2 Planning Systems and Procedures

-- Are the planning systems and procedures being developed adequate for Niger's forest sector needs? Do the systems and

procedures constitute, as designed and funded, a relevant part of the natural resources planning process?

The adequacy of the planning systems and procedures in forest inventory, silvicultural and local participation techniques to Niger's forest sector needs is addressed in other chapters of this report. This section addresses the adequacy of the planning systems and procedures in economics in relation to the needs.

Before the arrival of the Technical Advisor/Planner in 1985, the FLUP project had never strongly emphasized economics. Emphasis had always been placed on hands-on natural forest management, examining local participation issues, testing inventory techniques, and the creation of a forestry and land-use planning unit. Economics did not play nearly as important a part in the FLUP project as it should have played.

Since the arrival of the Technical Advisor (an economist) the emphasis has changed somewhat, albeit not nearly enough. The presence of an economist on the team who promotes the rigorous use of economic and financial analyses at all levels of the planning process, is effective and important indeed. However, his scope-of-work (SOW) does not make adequate use of his capabilities as an economist to concentrate on the tasks of institutionalizing economics in the SPD (see 2.2.3 below).

Among the purposes of the FLUP project are developing methodologies, analytical techniques and procedures as they relate to inventories, soil conservation activities, local participation scenarios etc. The specific how-to's (techniques, procedures etc.) of economic and financial analyses of resource development alternatives as they relate to planning are not included. While it is presumed that economics is an important part of the project, it has never surfaced as a discipline to be solidly institutionalized within the SPD. It should be kept clearly in mind that natural resources management from the biological point of view only, is only half the picture. The economic and financial aspects must be considered on an equal basis.

-- To what extent do the analytical procedures, planning systems and studies developed to date satisfy project goals?

The analytical procedures, planning systems and studies developed to date largely do satisfy project goals, as they are defined. The problems remain, however: lack of coordination between technical assistance inputs, and the lack of emphasis on economics. Further, however high in quality the studies may be, their impact is greatly diminished unless they are used to directly strengthen the DFF through the SPD. On the positive side, the presence of the Technical Advisor on the team as a planner, and the creation of the SPD have started to sensitize GON and other donors

to the fact that planning in the forestry and natural resources sectors is prioritized. This is further emphasized by the several well-received project-organized seminars on planning.

-- What other follow-on actions are suggested in the planning area, both long and short term?

The team does not suggest that any new activities be undertaken in the event of a project extension. The original goals and objectives of the project and the present set of tasks as outlined in the Plan d'Organisation are still valid, yet it is essential that additional time be given and a different implementation structure be developed in order to successfully complete them. It is also important to take into account that the project budget has already been increased by \$250,000 in 1986, which represents approximately 6.7 percent of originally budgeted amount. This should mean that the Mission has already used nearly the maximum amount allowable (at its own discretion) to phase out project activities. Were any new activities to be added, therefore, additional moneys would have to be raised, which would require that the decision be made in Washington.

### 2.2.3 Technical Advisor

-- Does the scope of work of the Technical Advisor/Planner represent project goals and objectives? To what extent has he satisfied his scope of work?

According to the SOW of the Technical Advisor, his responsibilities are planning and coordination. He is asked in the SOW to function as an economist only peripherally. In his capacity as planner and coordinator, he has done a commendable job despite the difficult working situation described above. He has had to adapt to the local administrative structure performing many tasks not specifically listed in the SOW. The evaluation team is very much aware that the realities and often times small crises of day-to-day project management often consume more time than the assigned "published" tasks. More importantly, however, while the SOW "published" tasks adequately represent the project goals and objectives as defined, they have little meaning in view of the current lack of direct collaboration between SPD and the project. Because of this separation, the Technical Advisor is not in the position to "assister le Projet PUSF et le SPD...." with the numerous tasks which require his collaboration. Consequently, he is prevented from producing many of the deliverable products for which he is held responsible in the SOW. This is a fundamental issue or flaw in the management of the project that should be resolved between AID, the Director of the DFF, the Project Director and the Technical Advisor.

Perhaps the more important issue in the question concerning the SOW is the evaluation team's perception that an error of omission has occurred. The present Technical Advisor is an eminently competent forest economist who could provide very important and essential professional input to the planning process and to SPD as mentioned above. This would include responsibility for ensuring that the economics capability of the SPD be institutionalized on an equal basis with the other planning expertise and functions envisioned.

#### 2.2.4 Technology Transfer

- What recommendations can be made regarding an effective total transfer of forest resource planning responsibilities to Nigerien professionals? Have adequately trained counterparts been available as planned?

Transfer of field technology from the expatriate team members to their present counterparts is working reasonably well. The major problem is that none of them (with the exception of the Project Director and the SPD Director) have the level of academic training required to ensure that their acquired skills will actually be used. Without a much higher level of academic training these counterparts will never occupy any position with decision-making and/or planning responsibilities, despite the fact that the present counterparts may be highly capable and motivated.

The transfer of technology from the project through the SPD to DFF is not functioning as intended in the Plan d'Organisation. The technical assistants are working with counterparts to develop and perfect analytical tools, methodologies and procedures which are supposed to be adopted and used by the SPD staff in their work. However, no effort is currently underway to ensure that the counterparts, once trained, will be assigned to the SPD. They should be assigned to the SPD if the transfer of technology is to be effective and useful.

The evaluation team notes that the long term training plans for counterparts anticipated in the project, were substantially weakened in the 1985 Washington D.C. Program Week on Mission planning.

#### 2.3 Project Management Issues

##### 2.3.1 Counterpart Funds

- Has GON funding, especially counterpart funds, been provided on schedule? Were expectations on counterpart funding realistic? Has use of ASDG counterpart funds contributed to realization of project goal, purpose, outputs? In what way and to what extent? How could planning and programming of local currency resources be improved?

The ASDG counterpart (CP) funds have been available to the project for approximately two years, since 1986. Briefly, the CP funds are an Ag Sector grant given to the GON, managed by the Ministry of Plan. They are used to defray costs associated with the several A.I.D. projects underway in Niger. Projects tap into the CP funds according to the budgets they submit. The CP funds supplement the local costs in bilateral activities. For example, if the local cost proposal requests a budget of 800 million CFA, the funds will be supplied from two sources--the bilateral funds and/or the CP funds. If the bilateral funds can supply only 50 million, a portion or all of the remaining 750 million requested will be supplied from the CP funds. In short, therefore, the project does not suffer if the bilateral funds fall short. The extent to which the bilateral funds are short will generally be made up by the CP funds, as long as they are available.

The availability of the CP funds has been essential to the continued functioning of the project. Because they have been used to cover project operating costs, the pressure on the project bilateral funds has lessened. This, in turn, has allowed the technical assistance team to remain in the field longer. The major concern to the evaluation team regarding the availability and use of the CP funds, however, is the potential for undisciplined financial management. While there are certain accounting controls built into the use of CP funds, they are not adequate. The following steps describe the current accountability process:

- Each project section (volet) submits its budget request for the upcoming period. This step is a collaborative effort between the expatriate team members and their respective Nigerien section chiefs. Together they decide what needs to be done. Then they prepare the budget.

- The budget requests are checked and eventually approved by the Project Director and AID. The funding requests are then divided between the bilateral and CP funds, depending on their availability.

- Expenditures against each line item are made during the budget time period. Each expenditure is explained and documented. In the case of the CP funds, monthly accounting reports are submitted to the Secretariat de Comité de Gestion (who manages the CP funds) who approves the expenditures. Monthly accounting reports are also submitted to A.I.D. for expenditures made from the bilateral funds.

This system does not provide adequate control at the project level. All expenditures made, if properly documented, appear to be approved. Few disallowances are made. All gasoline expenditures, for example, appear to be automatically approved despite the fact that the log books for each vehicle are rarely filled out. The use

of project gasoline may be excessive in relation to the project needs. No one among the expatriate team members have been assigned the task of verifying that all expenditures are legitimate and fall within the project's SOW and budgetary line items.

It is strongly emphasized here that the evaluation team is refraining from commenting on the current adequacy of financial discipline in the project. The team feels it is important to point out, however, that financial discipline is not being adequately verified by anyone on the team, nor by AID. For this reason, it is recommended that the team leader be assigned this responsibility for the remainder of the project. In his capacity as technical assistance advisor, the team leader would advise against certain expenditures if he deems they fall outside the project SOW. If the expenditure is still made, despite his advice to the contrary, A.I.D. will have more information on which to base its judgment on whether the expenditure should be disallowed or be approved.

-- What has been the operational relationship, and what problems have been encountered in integrating the project into the SPD?

This question has been addressed in 3.2.1 above. To summarize, the project has not been integrated into the SPD. The major thrust of any extension of the project should be to ensure that the all outputs of the project (technologies, analytical procedures, studies, and trained counterpart cadres etc.) be properly channeled in the direction of and integrated into the SPD, as originally envisioned.

#### 2.3.2 Technical Assistants

-- Have technical assistants been used in ways conforming to agreed plans? Has staffing been appropriate to needs? Are work plans realistic followed?

The technical assistants appear to operate independently with little collaboration among them. The model sites component of the project produces studies and reports, but does not focus on integrating the lessons learned into the SPD. The inventory component produces, to some extent, information that is too broad to be of much use to the model sites component. The planning component is supposed to work in close collaboration with the SPD, but cannot for reasons outlined above. In short, the team is composed of individuals operating independently without much direction or coordination. They have no authoritative leadership. The Technical Advisor is unofficially recognized as a team leader but has no accompanying authority to ensure that acceptable deliverable products are produced in a timely fashion.

The workplans for the technical assistants, in and of themselves, are well conceived and realistic, and it is obvious that

some coordination has been provided for development of the workplans. However, in view of the fact that SPD is not functioning, additional efforts should be made by A.I.D. and the Project to change this situation and enhance to meaning of the work plans.

- A decision was made not to hire a sociologist. As a result, a number of tasks concerning social studies were not performed. Was this decision justified, or did it impair the project's progress toward its major objectives?

The decision not to hire a sociologist appears, in retrospect, not to have been detrimental to the Project. The success of the Guesselbodi model site is a fait accompli without the presence of a long term sociologist. The Guesselbodi experiment provides model site establishment formulae that require little additional sociological refinement. The Evaluation Team recognizes, however, the key importance of the inputs of a sociological nature provided by James Thomson, consultant to the FLUP Project on several occasions. Without these inputs, the Guesselbodi model site would probably have been structured differently with perhaps less successful results.

### 2.3.3 Project Finances

- Is information on Project finances available on a timely and complete basis to Project implementors? Are financial management and reporting practices adequate to Project needs?

As mentioned in the discussion on CP funds above, the project taps into two sources of funds--bilateral and CP funds. Bilateral funds are used to pay for the expatriate salaries, equipment and materials procured in the US, and for a portion of the project local recurrent costs. The CP funds are used to cover the remainder of the local cost budget requirements. Reimbursements are based on properly explained and documented expenditure receipts for both the bilateral and CP fund accounts. Project accounting reports are submitted on a monthly basis according A.I.D. regulations.

The financial reporting system that is in place is not hindering the project implementors. Expenditures are made, documented, submitted and reimbursed. The project has never had to shut down temporarily for lack of money in the checkbook because of tardiness in the reimbursement of project expenditures.

The adequacy of the reporting system, however, as mentioned above is wanting. Because there is little project level control over project expenditures by the expatriate team members, it is possible that financial discipline is not being adequately maintained.

-- How does the cost of different types of operations compare with the Project's expenditures budget?

According to AID's Office of Financial Management the budget preparation and approval processes are followed. However, Project expenditures under each budget line item seldom coincide with the prespecified spending limits.

#### 2.3.4 Relationship With AID

-- Has the level of communication between the Project and AID Mission facilitated efficient management of the Project?

Communication between the project technical assistants and A.I.D. takes place when there is a need. Individual team members see the A.I.D. Project Manager about their particular problems. There are no regular team meetings - other than the regular biannual implementation review meetings - where project issues are discussed, and consensus is reached before they are brought to the attention of the A.I.D. Project Manager. Project communications will definitely benefit from more regularly scheduled (bi-weekly?) staff meetings.

Because there is no designated team leader responsible for the overall coordination of all project inputs, this role of coordination becomes de facto the responsibility of the A.I.D. Project Manager. The Project Manager, however, has too many other demands on his time to be able to give FLUP project the close day-to-day attention it needs. Consequently, project activities cannot be properly monitored as they should. The intended focus of the project--all project activities to feed into and strengthening the planning unit--has been lost as a result.

#### 2.3.5 Reports and Diffusion

-- Are the lessons learned being adequately documented?

The lessons learned from the model sites are being documented, published and distributed to an extent far too modest in relation to the importance of the work accomplished. The success of the model sites should be published in reputable professional journals and publications and be widely distributed to other bilateral and multilateral donors. Moreover, A.I.D. should build on these lessons when designing forestry and natural resources projects for other countries in the Sahel region.

#### 2.3.6 Transfer of Project Management Responsibilities

-- How has the Project evolved toward a final transfer of responsibilities to Nigerien personnel?

The Project has not evolved toward a final transfer of responsibilities to Nigerien personnel. The Model Sites component is at a stage where this transfer can take place, and responsibilities have indeed been taken over by Nigeriens at Guesselbodi. However, the intended Project focus on the SPD, as discussed above, is lost because efforts to ensure that this focus be retained have not succeeded. Consequently, if the Project ends at PACD the present counterparts will be reassigned in various parts of the country and the impact of the Project will not endure. For the remainder of the project, therefore, it is essential that the focus on the SPD be recaptured and that the counterparts be assigned to continue working as a team in the SPD after the Project has ended.

#### 2.4 Recurrent Costs: SPD

This section presents a rough order-of-magnitude estimate of the recurrent cost requirements over a 10-year period for SPD under the assumption that the SPD will inherit most of the project-procured infrastructure, equipment and materials after the project has ended. Seven recurrent cost categories are considered. The general assumptions and the assumptions for each category are briefly discussed and given in Table 3.1 below.

##### 2.4.1 General Assumptions

- Conversion rate: \$1.00 = 300 F CFA
- Prices and costs held constant over the 10-year period
- Discount rate: 10 percent

##### 2.4.2 Building Maintenance

It is assumed that the SPD will be officed in the buildings now used as project offices. There are two office buildings plus one garage/library building. Based on current building maintenance cost estimates, a total of \$8,000 per year is assumed.

##### 2.4.3 Vehicle Maintenance

Four vehicles (two Toyotas and two all-terrain vehicles) plus a motorcycle from the project fleet will be assigned to the SPD. The maintenance on these vehicles is assumed to cost roughly \$12,000 per year, or approximately \$250 per month per vehicle.

##### 2.4.4 Vehicle Replacement

The four vehicles (above) are already over two years old. The assumed vehicle replacement frequency is every five years. In Table 3.1, therefore, the four vehicles are replaced in years three and eight for a total of \$75,000 each time.

#### 2.4.5 Gasoline and Diesel Consumption

Annual gasoline and diesel consumption is based on 250 liters per month per vehicle. The total cost is therefore approximately \$9,000 per year at today's gasoline and diesel prices.

#### 2.4.6 Trips/Per Diem

A total of \$20,000 per year is assumed for SPD in-country travel. This figure is based on approximately 10 days per month in the field for 15 people. The 15 people include the Chef de Service, the four Division Chiefs, the five or six project counterparts, and four drivers. Average per diem rate is estimated at 3,000 F CFA per day.

#### 2.4.7 Personnel

The personnel category includes the people who are now on the project's payroll, who will presumably continue to work for the SPD once the project has ended. They will then have to be added to the DFF payroll. Included in this category are one executive secretary, two typists, and four drivers. Average monthly salary including benefits is estimated at 54,000 F CFA. The total annual recurrent cost burden will be \$15,000.

#### 2.4.8 Operating Costs

Operating costs are composed of three sub categories--water and electricity (\$12,000/year), miscellaneous office supplies and equipment (\$9,600/year), and telephone (\$5,000/year). All of the estimates are based on current budgets.

#### 2.4.9 Results

The results given in Table 2.1 indicate that the recurrent cost burden for the SPD will be approximately \$90,000 per year (27 million F CFA) when vehicles are not replaced, and \$165,000 per year (50 million F CFA) when vehicles have to be replaced. In present value terms this amounts to approximately \$650,000 based on a 10 percent rate of discount, or the amount of money that would have to be deposited in the bank today at 10 percent to cover the recurrent costs of SPD over the next 10 years.

#### 2.5 Model Sites

The detailed discussions on the functioning of the model sites and cost and benefit projections are given in Chapter 3 below. This section is intended to highlight the most valuable lessons learned from the model sites, particularly the Guesselbodi experiments. The purpose of the discussion is to consider whether it would possible to institute a system by which the restoration of additional

degraded land could be financed out of the proceeds from the sustained yield management of Guesselbodi and other manageable sites. In terms of a short summary, the Guesselbodi model site is structured as shown in Table 2.1.

- Cooperative has been established, approximately nine villages are involved. Objective is to manage the 5,000 ha Guesselbodi Foret Classee for sustained yield for the benefit of the cooperative and the GON. Average sustained yield under management is estimated at 1.1 steres per hectare per year. Yields will gradually increase over time with management.
- Cooperative members harvest first all dead wood from the entire forest, then in 500 ha blocks, one 500 ha block each year. The harvesting/management operations are supervised by the Forest Service. Harvesting consists of selective cutting while seed trees are left. Management consists of enrichment planting (average of 15,000 trees for each 500 ha block) and guardian service. One guardian is responsible for approximately 1,000 ha.
- Cooperative members receive 850 F CFA for each stere they bring into the cooperative collection center. The collection center resells the wood to the wood merchants (truckers) for 1,500 F CFA per stere. The profit:  $1,500 \text{ F CFA} - 850 \text{ F CFA}$ , or 650 F CFA per stere, is divided 75/25 between the DFF and the collective respectively. This is a negotiated split between the DFF and the cooperative. The DFF is required to spend its 75 percent portion (488 F CFA per stere) on forest management. No spending restrictions are placed on the 25 percent to the cooperative.

According to the manual "Guide to Forest Restoration and Management in the Sahel Based on Case Studies at the National Forests of Guesselbodi and Gorou-Bassounga, Niger" ( ), the figures and DFF/Cooperative arrangements discussed above will produce a surplus of funds for the DFF after the 5th year of operation. This is very significant. A surplus of funds, which is already earmarked for forest management, can be spent on: a) intensified management of the same forest or b) restoration of other areas which are now degraded. If the latter option is chosen, additional hectares may eventually be brought under management. If so, more wood will be harvested and sold which will lead to additional surpluses. In turn, these surpluses could be used to restore yet additional hectares of degraded land, and so on. The whole process could be designed so that the restoration of degraded lands could be financed by portions of the proceeds from the management of the present resources, based on the Guesselbodi formula.

Table 2.1. Estimate of Recurrent Costs in US \$: SPD

Recurrent Costs	YEARS									
	1	2	3	4	5	6	7	8	9	10
Build. Maint.	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
Vehicle Maint.	12000	12000	12000	12000	12000	12000	12000	12000	12000	12000
Veh. Replacmnt.			75000					75000		
Gas/Dies. Cons.	9000	9000	9000	9000	9000	9000	9000	9000	9000	9000
Trips/Per Diem	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
Personnel Sal.	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
Operating Costs										
Water/Elec.	12000	12000	12000	12000	12000	12000	12000	12000	12000	12000
Sup/Equip/Mnt	9600	9600	9600	9600	9600	9600	9600	9600	9600	9600
Phone	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
TOTAL	90600	90600	165600	90600	90600	90600	90600	165600	90600	90600

Discount Rate 10%  
Present Value of Recurrent Costs 648034

## 2.6 Recommendations

### 2.6.1 SPD

The SPD is supposed to be the centerpiece of the FLUP project. As it stands now, it has been created, probably in response to pressure from A.I.D. to satisfy a condition precedent, but it is totally ineffective at the present time. If the FLUP project is to be extended it is essential that all remaining project activities be coordinated and focused on the SPD. The lasting impact of the FLUP project will only become manifest in a strong and functional planning unit adequately staffed by competent and well-trained professionals with levels of education sufficiently high to ensure that their planning recommendations made are actually considered. The present project counterparts, while it is recommended that they should be attached to the SPD, they could not be placed in any decision-making role because of their relatively low levels of education.

### 2.6.2 SPD Staffing

The staffing recommendations made in the Plan d'Organisation for the SPD should be implemented as soon as possible. The condition precedent should include that the now vacant division chef positions be filled with adequately trained people (high level of education) and that the current counterparts to the technical assistants be attached to the SPD under the appropriate division chefs, as mentioned above.

### 2.6.3 Economics

A strong emphasis should be placed on institutionalizing, in the SPD, the rigorous use of economic and financial analysis in the planning phases of forestry and natural resources projects. These are essential elements of project planning. The profile for the Chef de Division Planification et Strategie (as given in the Plan d'Organisation) should be changed from MS level forester with economics expertise to at least MS level (preferably PhD) in forest or natural resources economics. The reason for this recommended change is as follows: to be able to function effectively in the field of economics requires at least a graduate level degree. It is anticipated that none of the Division Chiefs of the SPD will be economists, with the exception of the Planification and Strategie Division Chief. Further, the "departements cellules" will probably not be staffed with people holding degrees any higher than the BS level. Among them, it is probable that none of them will have any expertise in economics. Therefore, if economics is to be properly institutionalized in the SPD, it is essential that the one person in this capacity be highly trained in the discipline and that he be placed in the position of some authority.

The economist/planner should be responsible for ensuring that economics is an active and integral part from the beginning and during the planning process. Unless this happens, economics will end up only playing a minor role late in the planning process when the decisions on what to do, why, and how, have already been made.

#### 2.6.4 Team Leader

The Project should be assigned a team leader with the accompanying management authority to verify Project expenditures and to ensure that the appropriate project activities be coordinated and focused on strengthening the SPD. Further, he should be held responsible for assuring that the project implementors (the Nigeriens) practice rigorous financial discipline in their project management. This does not mean that he should control the checkbook, it means he verifies, vis-a-vis AID, that all project expenditures fall within the project's SOW. If this responsibility is not assigned to the team leader, it automatically becomes the responsibility of the A.I.D. Project Manager. If this is the case, the Project Manager must be prepared to become much more involved in the day-to-day operations of the project than is presently the case. The evaluation team feels that the current Project Director would not object to this change in project management.

#### 2.6.5 The Technical Advisor

There are two possible avenues utilizing the current Project structure (Figure 1.1):

- Since the Technical Advisor already functions as the (unofficial) team leader, but without the accompanying authority, he could be officially given the authority to manage the expatriate team. However, if the current Technical Advisor serves in this role in the future, he would have to bring in economics consultants to address the work required in recommendation 2.6.3.
- Since the Technical Advisor is a well-trained and competent economist, his SOW could be changed to reflect a much stronger emphasis on institutionalizing economics in the SPD as emphasized in recommendation 2.6.3 above. If his SOW is so changed, the project would have to add another team member to handle the team management and coordinating tasks.

#### 2.6.6 Reporting, Monitoring and Evaluation

The FLUP PP presents an Implementation Plan and Evaluation Plan that provide general guidelines regarding project reporting, monitoring and evaluation. A detailed flowchart is appended to the PP showing activities to be carried out by the Project. These are translated to trimester reports from each of the four working

sections, as well as Project annual reports (e.g. Alegria, 1986; Daus, 1983) and work plans for various activities undertaken by the Project. In addition, Project Staff are producing several publications for internal and external distribution.

The Revised Implementation Plan provides detailed Implementation Schedules for each of the four Project Sections and the expatriate staff in each section. (Implementation of the Extension/Social Survey Section Schedule is incomplete because a Rural Sociologist was not hired by the Project). In addition to guidance given in the PP, the Implementation Schedule provides dates for completion of plans, study reports, seminars, annual reports, demonstration brochures, and training during the 1984-1986 extension period.

The "Rapport d'Exécution du Projet (1986) provides general guidelines for work conducted during 1987".

The document entitled "Guide to Forest Restoration and Management in the Sahel Based on Case Studies at the National Forest of Guesselbodi and Gourou-Bassounga" (1987) should be subjected to rigorous reviews, published, and widely distributed. The technical assistants and their counterparts should be given enough time during the remainder of the project to publish and distribute their findings.

#### 2.6.7 New Project

If an extension beyond June 30, 1988, is considered, the new project should be performed by an institutional contractor, not through individual PSC contractual arrangements.

#### 2.6.8 Code Rurale

AID and the project staff should make every effort to include lessons learned from the model sites in the new Code Rurale now being drafted by the GON.

#### 2.6.9 World Bank

The Project should establish a closer working relationship with the World Bank concerning the Bank's project on substitution of fuelwood with imported fossil fuel energy. To facilitate this cooperation, AID/W contacted Bank representatives in Washington to discuss the "Household Energy Subsector Project" design and to voice USAID Niger concerns. It is essential that any misunderstanding over the impact that natural forest management can have on the overall energy supply in Niger, be cleared up as soon as possible.

### 3. FORESTRY RESEARCH

This part of the evaluation is charged with responding to two general sets of questions: (a) those concerning model sites and forest management issues, and (b) those concerning training, documentation, and extension issues. It is necessary to emphasize that Mr. Hassane Moussa, agroforestry specialist with INRAN, was an integral part of the team in the preparation of this section.

In summary it can be said that both the Model Site and Documentation Center components of the FLUP Project have been technical successes, but much remains to be achieved with respect to manpower and institutional development before either component will have long-term impact in Niger.

The Model Site component of the FLUP project has made two fundamental achievements which have fundamental implications for the rural development of Niger, and other Sahelian countries. First, techniques developed by the Model Site Team (both DFF and TA personnel) will allow the Guesselbodi natural forest to be managed for sustained yields of wood and forage in such a way that revenues from the forest will cover all recurring costs. This development changes the conventional view of the potential for natural forest management.

Second, the formation of the Guesselbodi Woodcutters' Cooperative and the signature between the GON and the Cooperative marks the first time, as far as the Evaluation Team is aware, that the GON and a body of the population have joined together to share the stewardship of a natural resource and the benefits accruing from that stewardship. This cooperative agreement is fundamental. Instead of the Niger Forestry Service using its very limited resources on the nearly fruitless task of trying to control all wood harvesting, it is investing in providing technical assistance to promote sustained yield management of forests by farmers working in self-interest. The importance of this achievement cannot be overstated.

But, the probability of successfully extending the FLUP approach is linked to further development of DFF personnel in project planning and management and to institutionalizing Woodcutters' Cooperatives. In many respects the work that remains to be done before forestry land-use planning as developed at the Guesselbodi Model Site has wide-spread impacts is much more critical and difficult than that done to date. This is not stated lightly, because the work that has been accomplished to date merits high recognition.

Progress at the Documentation Center of the FLUP Project has a lower profile but is making significant contributions to increasing the effectiveness of the DFF. Through the work of the TA team and DFF counterparts, information at the Documentation Center is now much more accessible than two years ago and the institutional

memory of the DFF has been greatly strengthened through the cataloguing and organization of documents. A computerized data-base has been initiated which will increase accessibility to information, and the first draft of a DFF professional journal has been prepared. A Library Science graduate was trained by FLUP and has just started working with project technical assistants. However, our fear is that one of the technical assistance team will be leaving before she has had adequate time to work with the recent graduate.

### 3.1 Model Sites and Forest Management

#### 3.1.1 What have been results at the Guesselbodi Model Site Forest in terms of hectares restored, steres of sustained production, and costs and benefits of various operations?

Wood cutting has been under a management plan on all 5,000 hectares since 1983. Grazing and hay cutting is under a management plan on about 2,000 hectares with 500 additional hectares to come under management each year. Initial studies show that the average production of wood under management will be between 0.8 and 1.1 stere/yr/ha. over a ten-year rotation once the forest is protected. Growth rates will be slower in the initial years and accelerate sigmoidally. (We note that the protected state of the forest will increase productivity and estimate that an additional 25% production will result from management. We have no data at this time, but suggest that this hypothesis be tested during the second cycle.) Analysis of data collected from harvests of wooded areas of known age will provide more precise estimates of wood production. The analysis should be finished by December, 1988.

Restoration work was initiated in 1984 and includes enrichment planting and soil and conservation work. One parcel of about 300 ha. a year has been restored in this fashion at a cost of about 97,000 fcfa. The growth rate of these trees is site and species specific and subject to large variation, and no data are available at this time on the amount of wood or browse being produced. Qualitatively, the production from some of the species, mostly local, is impressive, especially where grown on improved microsites. We recommend that farmers and agriculturalists be brought to these sites to see the effects of improved microsite technology, most of which is sustainable in the context of smallholders. The production rates of the trees established on these microsites should be monitored. This information will be extremely useful to foresters, agriculturalists, and livestock specialists throughout the semi-arid region of Africa where little is known about production rates of these useful and adaptable species. (To put the significance of the value of knowing the production rates in perspective, much more is known about the growth rates of many exotics production of which is limited to favored and protected sites, are less adaptable to on-farm forestry, and which are often single dimensional in usefulness.)

Both quantitative and qualitative evidence demonstrate that the soil and water conservation work at the Guesselbodi Model Site significantly increased biomass of vegetative yields and improved the species composition. Soil scientists found that layering the soil with recalcitrant materials such as branches and millet stocks created a microsite favorable to increased production of trees, grasses, and pasture legumes (Chase, 1986). It is observed that the effects of this mulching are long-term and have led to establishment of increasing amounts of vegetation which further improves the microsite.

Further increases in biomass from watercatchment and soil erosion works were evident throughout the restored parcels. Enrichment plantings of Andropogon gyanus provide an unquantified amount of building material and hay. Thickets of Combretaceae have been established behind rock gully plugs on sites which had once been washed-out ravines. Sorghum yields of over one ton per equivalent hectare were produced in phosphorus-enriched microcatchments established on degraded sites concurrent to establishment of trees.

Wood harvesting under the Management Plan began in January, 1987, and we have developed a very rough economic analysis of its operation. As stated above, Guesselbodi is an extremely degraded site and the growth rate in the fourth year of management will be lower on the sigmoidal curve than in later years. The degraded state has a major impact on economic viability of the Guesselbodi Model Site, and it must be noted that the following analysis is for Guesselbodi only. Subsequently, the analysis for Boyanga, a slightly degraded site, is shown, which is more representative than Guesselbodi and more favorable.

About 2,500 steres have been estimated to be available for harvest in the first parcel. To conduct an analysis on the first parcel, we will assume that the stocking center manager will work 200 days at 1,000 fcfa/day during the season and that two guards will be required at 35,000 fcfa/mo. for one year. Other costs include printing permits and miscellaneous items. It is noted here that this budget is illustrative at this time. There were no adjustments made for inflation or discounted values of investment. It is believed that the numbers provide a close approximation to what it will cost to maintain the various activities until the operating and recurring costs are covered by revenues from the planned harvests. A design team should look closely at projected expenditures for both management and restoration costs and conduct appropriate economic analysis.

- Net Profits. Net profits are equal to gross profits from sales of fuelwood minus exploitation and investment costs. Gross profits do not include sale of permits which go directly into the forestry fund covered below.

Gross Profits:

(650 fcfa/stere) 2,500 stere = 1,625,000

Operating Costs:

Stocking Center Manager = 200,000

Printing Permits = 40,000

Miscellaneous = 40,000

TOTAL = 280,000

NET PROFIT 1,345,000

- Forestry Fund. The Forestry Fund is equal to all wood permit revenues plus 75% of net profits. It is used to pay recurring costs (guards, lodging for guards, and camels).

Forestry Fund:

100 % Wood Permits (40/stere\*2,500 st)= 100,000

75% of Net Profits = 1,008,750

TOTAL = 1,108,750

Recurring Costs:

2 Guardians \* 12 mos \* 35,000fcfa/mo = 840,000

Lodging for guardians = 200,000

Camels (pro-rated over 2 parcels) = 150,000

Camel Maintenance = 100,000

TOTAL = 1,290,000

GRAND TOTAL AFTER FIRST YEAR = - 181,250

Thus, under the present conditions at Guesselbodi, a degraded site put under management, an operating loss of 181,250 is shown during the present cutting year. A more realistic view is to look at the revenues vs/ the costs over a full rotation of 10 years. In conducting such an exercise, using conservative data from inventory work, it can be seen in Table 3.1. that all costs will be covered by the seventh year and have a net profit of 412,916 fcfa. In essence, putting the Forestry Land-Use Planning approach into use at Guesselbodi will provide sustained yields of wood and forage with no recurring costs.

Table 3.1. Cost/Benefit Analysis for One Cycle at Guesselbodi (FCFA)

YR	REVENUE	RECURRING COST	OPERATING COST	NET (Running Total)
1	Wood= 1,388,750	1,290,000	280,000	- 181,250
2		940,000		-1,121,250
3		940,000		-2,061,250
4	Hay = 533,333		50,000	-1,577,917
5	Grazing=750,000		25,000	- 852,917
6	Hay = 533,333		12,500	- 332,084
7	Grazing=750,000		5,000	412,916
8	Hay = 533,333		5,000	941,249
9	Grazing=750,000		5,000	1,686,249
10	Hay = 533,000		5,000	2,214,249

Two things are clear from the above analysis: (1) revenues will cover the recurring and operating costs associated with sustained yield management, and (2) much of the revenue comes from products other than fuelwood.

That the revenues from the first rotation would not cover all restoration costs is not an issue at the Guesselbodi Model Site. First, Guesselbodi would not have been chosen had economics been the primary consideration. Second, much of the restoration cost was for research to determine the best ways to conserve soil and water. The fruits of this investment are being seen as other sites are being put under management plans.

For the above reasons, it is recommended that USAID and the DFF continue to support the managed harvesting and some additional restoration work at the Guesselbodi Model Site. A period of six years is recommended in order to permit one full cycle of management and to continue the research which has already begun to produce results beyond the borders of the Model Site. This period is not believed to be excessive, especially in light of the funding periods of other projects in the Sahel. Agricultural projects, for example, have been funded by USAID since the early 1970's and are continuing at increased levels of effort. The notion is challenged that donor and GON monies invested in these programs have had the same magnitude of returns as those spent on the Guesselbodi Model Site.

The following personnel are recommended for continuation of the Model Sites component:

1. One university-trained GON forester from the DFF as operations manager. He will be Model Sites Chief and be responsible for operations at Guesselbodi. He will be

involved in all aspects of the management and Cooperative operations.

2. One senior forestry specialist to serve as technical advisor to the Model Sites Chief. He will be funded by USAID for three-years with possible extension as per the needs of the DFF.
3. Kollo-trained Forestry Managers for each site.
4. Volunteers to serve as technical advisors to Forestry Managers.
5. GON CLUSA agents for cooperative development and functioning.

Table 3.2 shows an estimation of the costs of continuing the management plan and restoration work at Guesselbodi for the next six years as before, inflation and discount notes were not used. The management costs are based upon above calculations. Each year an additional parcel will come under management and those costs are added. It is estimated that 300 hectares will be restored per year at a cost of 95,300fcfa/ha. The major cost will be in restoration and further planning may suggest that this cost be reduced through choosing the less costly restoration techniques (mulching vs contouring) and reducing the area restored. (Or, microcatchments may be constructed on a contractual basis where farmers are provided with P-fertilizer and sorghum seed and will get to keep the crop grown in the constructed microcatchment.)

The major product of the restoration work has been to establish models to demonstrate the viability of natural forest management. This has been accomplished on about 2,000 hectares, and it may be timely to reduce the amount invested in this activity at Guesselbodi.

It is difficult to determine the impact on the surrounding villages of reducing the amount of project funds going for restoration. About 80 workers are receiving wages for restoration and this income has been a major boon to the area, but further funds spent on restoration probalby will not provide economic returns. Moreover, we understand that some members of the Woodcutters' Association are making nearly as much from wood cutting as from wages. The revenue from wood cutting and hay marketing should increase.

**Table 3.2. Estimated Cost to Support Guesselbodi Model Site Operations\***

YR	Net Costs For Harvesting (000) Parcel						Restoration (000)	Total (000)
	I	II	III	IV	V	VI		
1	181						28,590	28,771
2	1,121	181					28,590	29,892
3	2,061	1,121	181				28,590	31,953
4	1,578	2,061	1,121	181			28,590	33,531
5	853	1,578	2,061	1,121	181		28,590	34,384
6	332	853	1,578	2,061	1,121	181	28,590	34,716

TOTAL FOR SUPPORT OF GUESSELBODI MODEL SITE	fcfa	193,247,000
	\$	644,157

\* These figures not discounted

In the prescribed protocol of choosing a site to put under management, sites are chosen which have potential for sustained yields, which have viable markets, and where much of the area is ready for management with acceptable restoration costs. Many of these areas also happen to be undergoing degradation, and, the longer before they are placed under a management plan, the higher the cost of restoration.

Boyanga is one such site. This area of 12,000 hectares is a slightly degraded Forest Protegee within the market radius of Niamey. It is being prepared for management by the Model Site Team. In order to get a more realistic view of the returns to investment on this type of site, we conducted a short analysis similar to the above noting the following differences: (1) because the state of degradation is much less severe at Boyanga than at Guesselbodi, restoration costs are lower and hay harvesting is anticipated sooner, (2) parcel sizes are 800 ha. vs 500 ha, (3) this analysis is conducted on a per hectare basis. (4) no fees have been placed into the Woodcutters Cooperative Fund--all have been calculated to pay off the loan, and (5) all figures have been discounted at 10%.

It is noted on Table 3.3 that the restoration costs would be paid off after 11 years if none of the fees went into the Cooperative Fund. If funds for restoration of a site like Boyanga were advanced as a loan with a 20 year payback period, the monies returned to the account could go into a revolving fund to be loaned to other Associations to implement natural stand management system. A 20-year pay-back period is suggested to allow some of the revenues to be put into the Cooperative account during the first ten years. These funds could also be used to finance comprehensive land-use planning. (See "Revolving Fund" in Section 5.)

Table 3.3. Cost/Benefits for the Boyanga Protected Forest (FCFA)

Costs/ha:

Restoration	=	13,000	
Plantation	=	12,500	
Pasture Work	=	2,000	
Sub-total	=	27,500	
50%			13,750/ha
Recurring Costs=			1,000/ha
Operating Costs=			250/ha

Revenues/ha

Wood Fees(10 st/ha)=	6,500
Permit, 40 fcfa/st =	400
Hay Sale,	
200 kg/ha/yr/3kg/bundle	
67 bundles/ha 15fcfa/bu =	=1,005
Hay Permits, 1fcfa/bu	= 67
Grazing Permits,	
5fcfa/kg 300 kg/ha	=1,500

YR	FEES	-----COSTS-----			ANNUAL NET INCOME	NET INVESTMENT RETURN	
		RECURRING	OPERATION	RESTORE			
1	Wood =6,500	1,000	250	13,750	-8,500	-	8,500
2		909			- 909	-	9,409
3	Hay = 826	826	103		- 43	-	9,452
4	Graze=1,127		53		+1,074	-	8,378
5	Hay = 732		48		+ 684	-	7,694
6	Graze= 931		43		+ 888	-	6,806
7	Hay = 605		39		+ 566	-	6,240
8	Graze= 770		36		+ 734	-	5,506
9	Hay = 500		33		+ 467	-	5,039
10	Graze= 636		30		+ 606	-	4,433
11	Wood*=3,132		48		+3,084	-	1,349
12	Wood 2,278	350	88		+1,840	+	491
13		319			- 319	+	172
14	Hay 310	290	36		- 16	+	156
15	Graze 395		18		+ 377	+	533
16	Hay 257		16		+ 241	+	774
17	Graze 326		15		+ 311	+	1,085
18	Hay 212		14		+ 198	+	1,283
19	Graze 270		13		+ 257	+	1,540
20	Hay 175		11		+ 164	+	1,704
21	Graze 223		10		+ 213	+	1,917
22	Wood 1,098		17		+1,081	+	2,998

\* A 25 percent increase in productivity during the second cycle is assumed due to the improved soil and water holding characteristics developed under the management program. Data from research on the Guesselbodi Model Site support this assumption (Chase, 1986).

3.1.2. What techniques have been developed through the Guesselbodi experience in the areas of resource identification, protection, rehabilitation, and production? How broadly can these techniques be applied after the Project has ended?

Numerous techniques for soil and water conservation have been either developed or adopted at the Guesselbodi Model Site and these are commented upon below. Resource identification is more fully covered in section five under discussions on inventories. Production of trees, shrubs, and herbaceous forage plants is being done both through management of natural vegetation and through enrichment plantings.

As stated above, techniques used at the Guesselbodi are being used elsewhere and have wide potential application, on farm and grazing land as well as on forested land. There are, however, constraints to successfully extending some of these techniques. By law, use of Guesselbodi classified forests is under control of the state. Thus, techniques which require control over agriculture and livestock may not necessarily be successfully extended to farmland or open rangeland where these controls do not exist. There is, however, a legal means to create a "protected forest" which would put land under control of its use. This mechanism is being used in Boyanga and is planned for use in the Baban Rafi Forest.

Arguably, protecting a resource from uncontrolled use is the most effective "technique" developed at the Guesselbodi Model Site. The DFF is encouraged to work together with other Rural Development Services to include the FLUP approach to a more comprehensive land-use plan for use at the village level. A major reason that continued support is recommended for the Model Sites is that they serve as graphic examples of how land-use planning will provide sustained yields of food, forage and wood.

-- Resource Identification. (See Chapter 4)

-- Resource Protection. In the broad sense, vegetation, soils and water are vital resources being protected and managed at the Guesselbodi Model Site. Each of these are discussed separately in the following pages.

- Vegetation. The well-being of most Nigeriens is linked directly to the vegetative cover; this cannot be overstated. We have very strong evidence that decreasing productivity and declining quality of life are correlated very strongly with the ever-increasing loss of trees, shrubs and grasses. In the Sahel, millions of dollars have been expended by host countries and donors to increase production of food, forage and wood through introduction of technologies. To the knowledge of the evaluation team, attempts at irrigation, fertilizer, range, and

woodlots have had limited and sustainable impacts. In contrast, the Guesselbodi Model has shown that once placed under protection and a rational exploitation plan, indigenous resources can be economically managed for sustained yields of wood and forage without loss of vegetative cover and with few recurring costs. At Guesselbodi, these recurring costs should be covered within seven years by net profits and the Forestry fund. At Boyanga, recurring costs will be covered in the initial year (See Tables 3.2. and 3.3)

At Guesselbodi, guards on camels were used to protect the 5000 hectares. This is believed to be a much more effective system than putting up barbed wire and recommend it for new sites. First, the guards are to be paid from the revenues from the cutting permits, making it a "sustainable" line item instead of a capital cost. Second, the fence imposes a psychological as well as physical barrier and imposes negative feelings about the protected area. By excluding people from the protected area, they will not be able to see the benefits of sustained management. Third, a fence will make controlled grazing more difficult. Finally, the fencing material itself may have to be protected.

Guards have been used outside of foret classe/protege. In the mid-seventies, guards were used to protect the windbreak plantings on farmers' fields in the Majjia Valley. However, as more on-farm forestry has been extended in Niger, more use has been made of individual protection devices for trees. The UNO A. albida Project at Dosso is one such example.

-- Rehabilitation. Guesselbodi required extensive rehabilitation before being put under a Management Plan for exploitation. As stated many times, including the Management Guide, this step will not always be necessary. Guesselbodi represents a worse-case scenario for Foret Classes, and we concur with the FLUP team that priorities be given to areas ready for management. However, Niger has many degraded areas where the techniques used at Guesselbodi would be economically viable. The descriptions of the techniques are covered very well in the "Guide to Forest Restoration and Management in the Sahel".

Before moving to discussions of each technology, the issue of how to cover the costs of labor for restoration is noted here. It has been suggested that the eventual beneficiaries of the restoration work should take on the work without compensation other than the products of their labors. FLUP team personnel did not agree with this and the FLUP project paid for the labor. The Evaluation Team agrees that this was the correct approach. The incentive issue for tree-planting

is much bigger than can be handled here, and the discussion will be limited to the following observations:

- Restoration work was a gamble and farmers in Niger are in no position to assume additional risks. Not only was it unclear what the biophysical impacts of the restoration work would be, it was not clear to anyone at the beginning that products of the work would accrue to the workers.

- The work called for timely execution and an unpaid workforce would naturally place a higher priority on farm work.

- To serve as an example of appropriate technology, a workforce was needed that was controlled by the FLUP personnel.

- In the end, the Model Site has served as a viable demonstration of land-use techniques for the GON, donors, and farmers alike and paying labor for restoration seems not have created any damaging precedents. By permitting farmers to accrue benefits from stewardship of the Model Site, FLUP has demonstrated the effectiveness of a cooperative mode of management between the GON and a farmer cooperative wherein the State and farmers share both responsibility and benefits. With respect to the whole of Niger and to other Sahelian countries, it has not been shown that any government or donor can afford to pay for the restoration and maintenance of forest lands under present policies which underwrite policing and not participation. But, the FLUP Model Site Cooperative has shown that contractual collaboration between the GON and Farmer Cooperatives can lead to a system wherein productivity is increased and few, if any public funds will be required for recurring cost. In fact, it appears that the Service of Forests and Faune will also be a beneficiary from a steady and perpetual source of revenue to manage forests.

-- Contoured Trenches. These appear to have been effective in areas with a distinct slope and soils that have other than sandy texture. Where the trenches have been in place for a growing season or more, grasses, trees and shrubs were being reestablished. In many areas trees have been planted from potted stock and grass seed has been spread. Directly seeding trees has not been used on the trenches. The technique is straight forward and has been used extensively in Burkina Faso, Haiti and other sites in Niger. The water level to mark the contour is a small capital input and its use has reportedly been quickly learned. Personnel are still experimenting on the depth of the trench. In some cases the results behind the trench are spectacular, especially the growth of the Andropogon gayanus, a valuable species for both livestock and construction.

-- Microcatchments. Half-moon microcatchments which harvest water over a given area and funnel it to an apex has been effectively used to establish trees and grass. Personnel from FLUP and

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other projects said that this technique is not effective on sandier soils as the berm washes out. Farmers have noted the waterholding properties of this and have used them for sorghum and millet production in a number of places including the Keita project, in an Oxfam project in Burkina Faso and in the Major Valley. In our brief stay at Guesselbodi, microcatchments were not observed being used on-farm around the Model Site, but they shows good promise as a multiple-purpose on-farm technology, and the Model Site should be used by the Agricultural Service as a demonstration site in its extension.

- Rock Contours. Where rocks were available, they were placed in lines on the contours. The effect appeared to be similar to trenching and the rocks were reported to be more effective on sandy sites. Rock contouring has been used for generations in parts of Niger, most notably the Majjia Valley. On the hillsides of the Majjia, farmers are creating fields for millet production with rock contours and check dams. The water level used at the Guesselbodi Model Site would help farmers to be more accurate in finding the contour and would help them be more effective in checking soil and water erosion. This action has been proposed for the upper Majjia Valley as part of an extension of the FLUP technology to that area. It is believed that application of this technique and others used at the model site would have a substantial and enduring impact on farmer productivity.

- Mulching. Mulching of recalcitrant vegetative matter such as tree branches has shown to be an extremely effective method of reestablishing a vegetative cover and increasing soil productivity. Research by Robert Chase has quantified the impacts of this technology on various characteristics. Experiments have shown that the simple spreading of branches from a tree harvest is more effective in the long run in creating a microsite favorable to reestablishment of vegetation than is cultivation. The succession of vegetation on the Guesselbodi site on the improved microsites appears to be grasses and then shrubs and trees. It is noted here that this succession may be species-specific. In the case of establishing some acacias such as A. albida and exotics such as Neem (Azadirachta indica) and possibly Prosopis juliflora, pioneer grasses have been shown to be a major detriment to establishment. In many cases, trees, once established, will improve the microsite for grasses such that the major concentration of grasses in some areas in the Guesselbodi Model Site and outside was underneath trees and shrubs. Attention to the lessons learned about microsite improvement has application throughout Niger.

- Gulley Plugs. The Model Site is part of a watershed and has been numerous gulleys created by uncontrolled runoff. Gulley Plugs

have been established on the Model Site which are having a substantial impact on runoff. As the areas behind each dam has silted in, trees and shrubs have become established further stabilizing the watershed. As with the contoured placement of rocks in the Majjia, farmers use check dams and would benefit from the use of the water-level.

- Production. The Model Site employs both natural and artificial regeneration. Natural regeneration is occurring both from protection of standing trees, shrubs and grasses and from improvement of microsites. The natural succession on this land for the Combretum fuelwood species appears to be pioneer grasses followed by the Combretum. (Again, it is noted that this is not the natural succession for all systems.) Artificial regeneration has included planting-out potted tree seedlings and sowing grass seeds (primarily Andropogon gayanus). Both natural and artificial regeneration are dependant on (a) improvement of microsites as discussed above and (b) strict control of grazing, cutting, burning and farming. Achieving the second condition will be critical in extending the FLUP model to sites other than Foret Classe.

### 3.1.3. Staying Power and Replicability of the Guesselbodi Forest Cooperative

The formation of Land-Use Cooperatives and of contractual agreements between these cooperatives and the GON are being shown to be essential to the successful extension of land-use planning. It has been seen that where stewardship of resources is linked to accrued benefits for farmers, private initiative in resource management has increased substantially. Examples include establishment and protection of windbreaks and private woodlots, as well as the Guesselbodi Model Site. The importance of the Guesselbodi Cooperative contractual agreement is that it is the only one signed between farmers and the GON that describes in detail both the conditions under which the trees and grasses are to be managed and to whom the benefits of this stewardship accrue. In essence, the DFF is becoming a Service agency in the best sense of the word (provision of technical assistance to farmers) as opposed to a policing agency where farmers are seen as adversaries.

It appears that the farmers in the cooperative are working hand-in-hand with DFF personnel in managing the Model Site for a sustained yields of wood and forage and for soil and water conservation. They are apparently comfortable with the arrangement that a certain portion of the revenues from the cutting be put into the Cooperative to cover recurring costs of protecting the Model Site area. It appears that the GON is acting in good faith according to the terms of agreement.

An additional issue arises with respect to the Cooperative arrangement: what will be the impact of the World Bank proposal to

add additional taxes to fuelwood? Will this tax decrease the market for fuelwood from the Cooperatives and drive them into a black market arrangement? If the tax destroys the Cooperative arrangement, it will also destroy the opportunity to link stewardship to private incentives, and the situation where DFF becomes a policing force instead of a technical assistance agency may come back into existence. An alternative system was suggested by The Project Development Division during the Review process of this paper. Under the suggested scenario, all wood harvested from a managed forest would be exempt from the new tax rates.

3.1.4. What Extra Inputs will be Necessary for the Guesselbodi Operation to become Self-Sustaining, and Where will These come from?

This question of financial support for continued operations at Guesselbodi has been discussed in detail above in section 3.1.1. Here we will focus on our recommendations for other inputs.

- GON Inputs. The inputs required for sustained operations include operating funds for guardians and for DFF personnel. They include a commitment to place qualified personnel at the site and a commitment of the GON and the Cooperative members to respect the contractual agreement. The DFF will increase the probability of successful consolidation and extension of the FLUP model by assigning qualified and experienced personnel on a long-term basis. These personnel will become the specialists that eventually will train other DFF personnel to refine and extend the FLUP approach. The DFF would assign one person to be Project Director. The Cooperative is vital and A.I.D. has had experience in coop formation at the village level in at least one other USAID project. Assignment of GON personnel involved in that project to the Guesselbodi Coop may increase the effectiveness of the Coop.
- Technical Assistance/Model Sites. It appears at this time that continued technical assistance will be required to refine methods of taking inventory, of developing statistical formulas to determine the best parameters, and of developing and monitoring the plan for the site. Pending discussions with DFF, the Consolidation and Extension Phase of FLUP would benefit from long-term technical assistance of a Model Site Specialist and an Inventory Specialist/Biometrician. These specialist would work with DFF counterparts on a daily basis and be responsible to both the DFF head of FLUP and the Project COP who will be counterpart to the DFF Project Director.
- Technical Assistance/Cooperatives. The Guesselbodi Cooperative offers tremendous opportunities that go beyond the managed exploitation of the forest classe. CLUSA personnel have helped form cooperatives in a number of villages which have catalyzed a number of sustained initiatives. One Coop Specialist assigned to a GON Coop specialist in second phase of FLUP will increase the impact of this vital component.

--- Technical Assistance/Coordination. The major weakness of the first phase of FLUP has been coordination of activities. The consolidation and extension phase of FLUP will not be successful unless there is one person in charge and unless the Technical Assistance Team works hand-in-glove with the DFF and each other. It is proposed that the DFF Director have a counterpart to assist in planning and in team coordination.

3.1.5 Concerning the Model Site of Gorou Bassounga, what has been Accomplished in Terms of Management Planning and What Resources will be Required after the FLUP Project?

The FLUP Project converted the Gorou Bassounga classified forest into a Model Site in 1983 and initiated restoration and inventory work in 1984. The whole forest was inventoried for wood in 1986 and two parcels were inventoried for pasture in the same year. Agroforestry has been established on 330 hectares.

Starting with an extremely degraded site near the town of Gaya, the local project manager has directed the restoration and protection of 1,500 hectares. In two years run-off from the watershed has been graphically controlled. Deep gulleys have begun to fill in and the hillsides have been stabilized. Rain water that once cut gulleys and threatened the road and much of the town now is significantly absorbed behind the contoured dikes and barrages. Local species established on improved microsites have shown substantial growth. It is believed that the value of this work includes the value of demonstration to farmers of the value of the various techniques, including that of protection.

Future work includes development of a detailed management plan and organization of a Forestry Association. The management plan will be different from the Guesselbodi Model Site. In the Gaya area fuelwood does not have nearly the value as in the Guesselbodi region, but, due to higher rainfall, the species inside the Gorou Bassounga site have relatively higher value as artisanat and fruit-bearing trees. Thus, the inventory will include identification of specific trees which will be sold to individuals. It is believed that the inventory can be accomplished before June, 1988 if the project time is extended.

The cost of continuing can not accurately be determined until the above inventory is conducted. It is estimated that restoration will cost about \$200/ha (it is less degraded than Guesselbodi), but it is not known how much revenue to expect from the initial harvests. It is recommended that cost of continuation be examined when the inventory is finished. The team designing the subsequent phase would have to determine the benefits produced by further restoration investment.

3.1.6 What has been Accomplished in the Field of Site Identification Methods and Can These Methods be Applied by Nigerien Professionals in Determining Areas for Future Management Efforts?

- 1 -

Site identification methods have been developed and applied by both the Model Sites Section and the Inventory Section. Those of the Inventory Section will be covered in Chapter Four. The approach of the Model Sites Section will be dealt with here. The approach as used to locate Baban Rafi was found to be elegant. To find a favorable area to develop a managed forest, Model Site personnel identified the area from where wood merchants were harvesting. In this case, they were able to identify the Baban Rafi area that was both (1) a source of sustained wood supply if put under the forest land-use plan and (2) threatened with severe degradation if left to be exploited without a management plan. It is believed that this method is an excellent complement to other methods being developed by the Inventory Section.

3.1.7 What Other Sites have been Identified, What is Their Anticipated Utilization, And What Resources Will be Needed to put Them into Operation?

In addition to Baban Rafi, areas in the Zinder and Dosso area have been identified as possible sites by Model Site personnel. It appears that the Takieta Classified Forest has tentatively been chosen to be placed under FLUP to prepare it as an eventual sustainable source of wood for the Zinder area. A Peace Corps Volunteer and a DFF counterpart are ready to initiate the inventory under the guidance of FLUP-trained inventory specialists from DFF and of TA personnel. Villages around Koro have been visited by the Guesselbodi CLUSA agent, a B1-level forester and his Peace Corps counterpart in preparation for putting this area under FLUP.

3.1.8 How Functional and Effective are the Working Relationships Between the "Service de l'Amenagement des Forets Naturelles et de la Commercialisation des Produits Forestiers" and the Project?

The role of the "Service de l'Amenagement des Forets Naturelles et de la Commercialisation des Produits Forestiers" (SAFN/CPF) is to manage natural forests. The role of the Model Sites component of the FLUP Project is to develop natural forest management techniques. Ideally, these two units of the DFF should be in very close coordination, and, in fact, the FLUP Project Director is also the Chief of the SAFN/CPF. At the ground level, the distinction between FLUP and SAFN/CPF is not always clear, and consolidation of the tasks of the two units into one may be more effective. Work conducted at the Model Sites at Guesselbodi and Gorou Bassounga clearly is in the FLUP Project, and we understand that operations at Bassounga and Baban Rafi are under the SAFN/CPF. In fact, the same core of people are working all areas. SAFN/CPF has been substantially strengthened by having its staff work at the Model Sites. SAFN/CPF foresters trained in inventory, planning, mapping, and management techniques have made significant and independent contributions at Baban Rafi and Boyanga.

The major shortcoming of the link between the SAFN/CPF and FLUP has been the lack of training in project conceptualization and monitoring. While FLUP will have trained a cadre well-trained in the above-mentioned skills, the day-to-day conceptual work and project assessment has been done by the TA personnel. In subsequent phases, it is suggested that the SAFN/CPF assign a college trained forestry engineer to be counterpart to the TA personnel to work with them on a daily basis if the FLUP is to be extended. These professionals will form the core staff for natural stand management in the DFF and be the trainers in subsequent phases.

3.1.9 To What Extent will the SAFN/CPF be Able to Perform its Duties Without External Support?

It is thought that operation of the SAFN/CPF would be able to continue without FLUP Project funding, but at a reduced level. Counterpart funds would have to be used to support forestry-use management in each protected forest until the revenues from the harvests were large enough to cover recurring costs. Counterpart funds would also have to be used to cover operational costs for FLUP-trained foresters in the SAFN/CPF to manage the protected forests and to facilitate the formation and organization of the Woodcutter's Cooperatives. But, in talking to SAFN/CPF personnel, it was understood that they wish to have several more years of technical assistance to consolidate the gains and to realize the potential of the FLUP approach. It was further understood that these DFF personnel who are now able to practice essential skills in forestry land-use planning (mapping, inventory, conservation, management, etc), believe that additional input is needed to develop conceptual and assessment skills. To put the value of technical assistance in another way, natural forestry management is a brand-new concept to Niger, while it has been a core part of US forestry training.

3.1.10 Are the Forest Management and Conservation Techniques being Developed Adequate for Niger's Long-Term Needs? Will Additional Efforts be Necessary, and, if so, in What Specific Aspect?

It was observed that forest management has been little more than a term in Niger until put into practice at the Guesselbodi Model Site. For some good reasons, the Forestry Code in Niger emphasizes protection and has little, if any, provision for managing natural stands for sustained yields. One of the main reasons that it required several years before initiating a management plan at Guesselbodi may have been due to lack of a precedent in Niger. Once put into place, much effort was put into developing and testing various methods of vegetation and soil management. The task of determining the "most" cost-effective methods has been compounded by the variety of biophysical conditions found on the site. Our observation is that the techniques developed at the Model Sites, (as discussed in section 2.2) have wide application for a variety of sites and a variety of

socioeconomic conditions. In fact, as pointed out in section 2.2, many of these are being used on farms and forests in Niger and in other parts of the Sahel.

The Model Site team is understood to be relatively comfortable with the manner and timing of harvesting major fuelwood species. As we understand it, work still remains on determining the best rotation for some high value trees. It is also believed that much remains to be known about the growth rates of the trees established on improved microsites.

3.1.11 Are the Nigerien Professionals being Adequately trained in Forest Management and Conservation Techniques? Do They have the Necessary Technical Background?

Despite the lack of a forestry management tradition in Niger, impressive progress by DFF personnel in mapping, inventory techniques, and basic planning was observed. As an example, the main architect of the management plan for the Baban Rafi Protected Forest was a SAFN/CPF forester trained at Kollo and at the Guesselbodi Model Site. This individual and other DFF foresters have done much of the basic work at Boyanga and will be providing much of the technical inputs at Korou. Equally impressive has been the management of the performances of the Model Site managers at Guesselbodi and Gorou Bassounga. As we understand it, the day to day operations of both sites have been in the hands of DFF managers for the last couple of years. These people received much of their training at the Guesselbodi Model Site.

A lack of manpower trained was not seen in the overall principles in forestry management. The most pro-active architects of the basic FLUP design are understood to be expatriate foresters. Their training apparently provided them with a perspective as well as the specific skills required to guide the FLUP Project from the conceptual to implementational stage. Unfortunately, much of the institutional experience of the development of the FLUP Project resides with the TA team.

3.1.12 What Recommendations can be Made Regarding an Effective Total Transfer of Model Sites Responsibilities to Nigerien Professionals?

As discussed above, the primary missing link is the lack of university-trained foresters who are integrally involved in both the daily operations and the long-term management planning. If the investment made to date in natural stand management is to realize its full potential, a university-trained DFF forester must be the chief of the Model Site Section and counterpart to the Model Site member of the technical assistance team, and he must be committed to spending a great deal of time on site.

3.1.13 Do the Scopes of Work of the Technical Advisors Represent Project Goals and Objectives? To What Extent have They Satisfied Their Scopes of Work?

The Revised Implementation Plan (1984) has been used as the basis for the Scope of Work.

- Guesselbodi Model Site. The TA team has more than met the SOW in providing guidance in protecting and rehabilitating the site. Likewise in promoting local village participation in management of the site.
- Gorou-Bassoung Model Site. The agroforestry work has continued and inventory work conducted. Contractual arrangements have been implemented between farmers and the GON for integrated agroforestry plantations.
- Demonstration and Training in Natural Forest Management. The "Guide to Natural Forest Management" has been circulated for comments. (Its publication, translation, and distribution to other semi-arid zones is recommended.) Students at Kollo and the University regularly work, train and conduct studies at the Model Sites.
- Third Model Site. The Boyanga forest has been declared protected. DFF personnel and university students, working with FLUP TA have mapped, inventoried, and prepared a management plan for it. Similar progress has been made at the Babban Rafi Forest.
- Forestry Study Tour. Members of the FLUP Team provided technical assistance to USAID missions in Mali and Burkina Faso and the Model Site Team hosted study groups from Senegal and Sudan. This is thought to meet the prescribed scope of work.
- General Advisory Work. As discussed in detail above, natural forestry management has been a weak part of the training of DFF forestry personnel. A strong grasp of the basic ideas and techniques of forestry management was observed and this achievement was attributed to the training provided by the TA team. The team provided pivotal support in other aspects such as formation of the Cooperative.
- Other Tasks. The TA team provided significant inputs in other activities not addressed under the Model Site section. These include socioeconomic surveys of villages and organization and conduct of seminars to Departmental level DFF personnel.

In sum, no deficiencies are seen in the Model Sites Team meeting assigned scopes of work. To the contrary, the TA team surpassed their prescribed SOWs in most cases.

3.1.14 What Other Follow-on Actions are Suggested in the Model Sites Area, both Long and Short Term, especially in Research Needs?

As suggested above, as the Model Site techniques move into Foret Protege Sites, the whole farming system must be considered. It is our observation that the probability of successful extension of land-use planning to other parts of Niger not contingent to a Foret Classe will be increased by integrating the FLUP technology with on-farm forestry and livestock techniques. These techniques include establishment of windbreaks, living hedges, woodlots, and gao plantations. Experimentation of integrating FLUP and on-farm forestry technology is suggested.

These on-farm techniques are well-developed in Niger and are being extended from farmer to farmer in several cases. It is added here that several of the techniques used at the Guessebodi Model Site have been used elsewhere for soil and water conservation. These include the use of the water-level for contour establishment of ridges and microcatchment developed and extended in the OXFAM Agroforestry Project in Burkina-Faso. Establishment of windbreaks, living hedges, and gao plantations are better accomplished under the Taungya system being used on on-farm forestry projects in Niger and elsewhere.

3.1.15. What is the Total and Projected Capacity for Land-Use, Agronomy, and Natural Management Research in Niger? What Exists in USAID/Niger Bilateral Portfolio that can Assist in this Area?

First, the observation is made that from a farming systems point of view, a farmer does not make a distinction between land-use, agronomy and natural resource management. When he looks at a tree, he sees it as a multipurpose resource providing forage and wood, maintaining soil fertility, and protecting his soil from erosion and his crops from moving sand. Sound scientific evidence exists showing that disaggregating the three concepts is artificial and wasteful of the limited research resources available in Niger.

With respect to the USAID/Niger bilateral portfolio, it is suggested that the Mission consider the FLUP and On-Farm Forestry Techniques in the context of their impacts on agricultural development, as well as on the forestry and livestock sectors. There is a misconception that tree-based projects should be the concern of only the forestry service. However, it appears that the largest sustained impacts on dryland farming has been from on-farm forestry projects (Windbreak and the Acacia albida Projects). On-farm trials of several Model Site soil conservation techniques may have immediate impacts on farm productivity. For example, the waterhose level would help farmers in the Majjia construct better contour dikes. Clearly, it would be more effective to consider technologies in the context of the produced impact and not in the nature of the means to achieve that impact. It is recommended that all USAID/Niger projects give serious consideration to integrating the FLUP and On-Farm Technologies into agricultural research projects. See Sections 5.1 and 5.2 for discussion of a Comprehensive Land-Use Plan.

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It is also understood that the ASDGII is focussing on policy reform. In view of the signing of the agreement between the GON and the Guesselbodi Woodcutter's Cooperative, the Model Site experiment merits close examination to see the benefits from this major policy innovation.

### 3.2 Training, Documentation, and Extension Issues

It is recognized in the Project documentation that human resources play a key role in resource management and protection. In general, this element of the Project carries out the analysis of long-range personnel needs and the design of training, orientation, and extension education programs needed for this purpose for the DFF. There are four specific aspects for this element of the project which the Planning Unit is charged with doing:

#### 3.2.1. To What Extent Does the Planning Unit's Organization and Implementation Plan Satisfy the Requirements of the Fourth Amendment in the Areas of Documentation, Training, and Extension? Are There Any Major Changes, and, If So, Are They Justified?

It is recognized in the Project documentation that human resources play a key role in resource management and protection. In general, this element of the Project carries out the analysis of long-range personnel needs and the design of training, orientation, and extension education programs needed for this purpose for the DFF. There are four specific aspects for this element of the project which the Planning Unit is charged with doing:

- building up staff capability in the DFF, especially the new Planning Unit, both through in service and forward training programs;
- familiarizing other MHE (now the Ministry of Agriculture) officials with the Project's purposes and plan of implementation, including the ultimate benefits which will accrue to other services (Agriculture, Livestock) and the role these services can play in collection and assessment of data and preparation of plan;
- familiarize other ministries and government units with the Project, so that government-wide support can be gained for natural resource conservation and management; and
- instigate a campaign to increase public awareness of, and sensitivity to Niger's natural resource problems, and what they and their government must do to ameliorate such problems.

The first major emphasis is on-the-job training for DFF technicians and foresters to improve their proficiency in resource planning, management, and conservation. Selected middle and

higher-level personnel receive additional practical and some academic training, either in Niger or out-of-country, as appropriate.

In addition, various multi-disciplinary workshops on forest planning, plus French language seminars on development management, are planned. Study tours in other Sahelian countries are also planned.

The Fourth Amendment instructs the Documentation Center unit to prepare a management information system and to organize a small library for the DFF. On page 28 of the "Rapport d'Execution du Project" of May, 1986, it is observed that the Center is instructed to establish working relationships with INRAN. The TA at the Center have initiated this relationship, and we believe that this will be helpful for the long-term coordination of the DFF and INRAN.

Analyses of the above issues regarding documentation has been done in the following sections, and the reader is directed to those sections.

3.2.2. Is the Documentation Center an Effective Information Tool in Support of the Planning Process? Is the Library a Functional Source of Information? To What Degree Can It Operate Without Outside Help?

It is believed that an effective Documentation Center is absolutely necessary for the successful extension of forestry initiatives in Niger. The Documentation Center serves as a key component of the institutional memory of the Forestry Service. Lessons learned from past work will be lost without some systematic way to retrieve them, and the risk will be greater that future projects will repeat mistake or fail to build upon successful initiatives. Moreover, many GON foresters who started their careers in the fifties and who represent a vast store of knowledge which will be lost if not collected and catalogued. The problems in Niger which the DFF faces are too great and the resources too few not to have and to use a functional documentation center.

As to the questions of whether the Documentation Center currently is an effective information tool and whether it is supporting the planning process, it has been observed that the Center has made substantial progress in organizing the information, but that DFF personnel have not made maximum use of the resources. It has, though, received increasingly greater use by volunteers and consultants who are charged with formulating and evaluating projects. From the personal experience of members of this Team, access to a systematized documentation center is vital in the formulation of programs. Certainly, from the point of view of DFF and the donor, opportunities are being lost to attract investment merely because the right information can not be accessed. In this sense, continuation of the work at the Document Center is a cost-effective input for both USAID and the DFF.

The Documentation Center, like the Guesselbodi Model Site, is thought to be at the point where it is having an impact, and it needs more time and resources to realize the full benefits from the investment. If technical assistance is dropped at this point, the probability that much of the hard-earned knowledge gained in Niger will become part of an accessible institutional memory will be greatly decreased. It is recommended that USAID, with the concurrence of DFF, extend contracts to both technical assistants until December, 1987, and perhaps until June 1988.

Substantial progress is seen on at least five fronts: organizational, training, information dissemination, networking, computerization. It is recommended that the technical assistance team continue to work with the newly-trained GON Library Scientist Graduate to consolidate these gains before the end of December, 1987.

#### -- Organization Progress

The documentation component has increased accessibility by organizing documents by themes and by instituting the Classification Decimale Universel or CDU system. The CDU system replaces the inventory system wherein documents were catalogued in the order of arrival. Under the present "inventory" system, documents are placed on the shelves according to topic. The CDU system is especially important to users who have a general idea of what they are looking for, but do not have a specific topic identified. It is also extremely important to people looking for specific information about past and present project documentation.

In particular, documents are being organized by the the following themes: projects, catalogues, bibliographies, seminar and conference reports, departmental and arrondissement reports, government and ministry reports, references, periodicals, administration/archives, and classified forests.

#### -- Training

The PUSF Project trained a library scientist at the University of Dakar. He recently finished his studies and began work at the PUSF Documentation Center two weeks prior to this evaluation. From observation and interviews with him, he is believed to be well-trained, competent, and highly interested and motivated. In particular, he is aware of the need for information centers to "market" their resources by (1) letting people know what is in the center, (2) responding to the needs of the users, and (3) making the center more accessible and useable. Unfortunately, he is scheduled to serve one year in the "service civique" (consequently being lost to the Documentation Center) and his counterpart is scheduled to terminate her contract at the end of the current month. The occurrence of either of these happenings will greatly reduce the future effectiveness of the Documentation Center.

It is recommended that the DFF request that he be permanently assigned to the Documentation Center. It is suggested that the DFF point out that PUSF funds were used to train him, and he will be an extremely valuable resource in terms of helping to attract resources to DFF programs.

As above, the team recommends that his counterpart be given a contract to work with him to institutional the various projects and to provide computer training.

#### -- Information Dissemination

The first copy of a professional bulletin is in the final draft form. This bulletin is believed to be a timely tool in the extension of PUSF and other rural forestry projects. As stated throughout this report, much progress has been seen in application of appropriate techniques and in Cooperative work. It has also been stated that these techniques and the Cooperative experience have application outside PUSF and have noted that PUSF could or has used experiences from elsewhere in Niger and the Sahel. (And, it has also been noted that PUSF personnel were not always aware of forestry and agroforestry work being done outside of PUSF which could have application.) Up until now, information about hard-earned experiences has been exchanged through personal contacts: a very expensive and fragile system. The Bulletin, if it is published on a regular basis will be a means to institutionalize information dissemination.

The Bulletin also offers the opportunity for professional growth. Professional foresters in Niger often have much to offer but very little opportunity to publicly record their findings and experiences. Collectively, the practical information held by DFF field foresters is of considerable worth and the Bulletin would serve as a repository. The alternative is to lose that information, much of it specific to the Sahel or to Niger. Fewer resources would have to be spent in trying to import technology if more information about what worked (and did not work) in Niger were available. Finally, many good DFF foresters deserve the recognition that would come from publication. It is recommended that the PUSF continue to support the Bulletin. However, authors should not be compensated for publishing articles.

#### 3.2.3. What has Been Accomplished In the Field of Training Nigerien Professionals in the Various Specialties Involved In The Project?

Training of the recently-graduated Library Scientist has been a major accomplishment by the FLUP Project in the Documentation component. It is the Team's understanding that some DFF personnel were trained in basic skills such as arranging titles according to the CDU system, but the arrival of the Library Scientist is the first opportunity to work with counterparts at the higher skill

levels required for continuation of the Center work after the departure of TA personnel.

With respect to the Model Sites Unit, a number of workshops were conducted. These were discussed in Section 2. It has been noted several times that key SAFN/CPF personnel have been trained in the skills of site identification, mapping, inventory work, socioeconomic surveys, basic soil sampling, forest management, and planning. The results of this training has left the SAFN/CPF with a cadre that currently is filling the roles which TA team members had filled a couple of years ago. SAFN/CPF inventory specialists, for example, conducted the studies at Baban Rafi and will be conducting inventory studies at Korou and other sites. Training by Model Sites team has been a major step in creating DFF's capacity to continue forest land-use planning and management.

The training of personnel who will conceive and assess forest land-use plans has not been as successful, however. While the Kollo graduate foresters have done an excellent job of picking up the skills noted above, we believe that lack of university-trained counterparts to the Model Site TA team has left a gap in the critical manpower requirements for continuation of FLUP. It is thought that successful continuation will require technical assistance working with a university-trained counterpart.

3.2.4. What Has The Project Accomplished In The Field Of Long-Term Training? Should Any Follow-on Be Considered? What are Constraints To Training? Recommendations for Eliminating such Constraints?

The formal training in Library Science of the current GON counterpart by the PUSF Project is a major accomplishment of the project and sets the stage for establishing a functional Documentation Center required for successful achieving FLUP Project goals. However, the effectiveness of this person will be greatly compromised if he does not have the benefit of working for at least three months with the current Peace Corps Volunteer counterpart, and if he does his year of "service civique" somewhere other than the Documentation Center. It is judged that the return to much of the investment of his training and the gains made by the TA personnel will be lost.

It is understood that the FLUP Project has funded four MS degrees and one BS degree in the US and two BS degrees at Bouake. None of the returned graduates had direct involvement with the Model Sites, and the impact of long-term training on that component is not being evaluated. While it is believed that the graduates who have returned to Niger are having and will have important impacts. Specific accomplishments were not assessed. We do point out, however, that we believe that the development and extension of forest land-use planning will be greatly facilitated by the presence of these trained throughout the DFF.

3.2.5. What Has The Project Accomplished In The Field Of Extension, e.g. Forestry Training Programs?

The work at the Guesselbodi Model Site has correctly focussed on development of technologies, not extension. However, it is believed that the soil and water conservation techniques being used on the Model Site are appropriate for some farm sites and would not be surprised to learn that workers have adopted the techniques to their own farms. Extension of the techniques is seen to be a larger part of an extension phase of FLUP to Forêts Proteges.

3.2.6. To What Extent Have Project Experiences Been Made Available To Formal Forestry Training Programs?

It is the Team's impression that much of the training of DFF personnel has been on the site. It is believed that several agents have received invaluable experience in the development and implementation of site identification and inventory work. It is suggested that these individuals remain with the FLUP Project to refine these skills. It is believed that these individuals will be the key personnel to extension of the Model Site technologies and to training other DFF personnel. Retention of these individuals in the Project is suggested as a condition precedent to funding of a follow-up phase.

3.2.7. What Recommendations Can Be Made Regarding An Effective Total Transfer of Training, Documentation, and Extension Responsibilities To Nigerian Professionals?

Discussed above in section 2.2.---

3.2.8. Does The Scope Of Work Of The Technical Advisor Represent Project Goals And Objectives? To What Extent Has She Satisfied Her Scope Of Work?

Comments are made on the accomplishments by each member of the Technical Assistance Team at the Documentation Center. The Peace Corps volunteer has been working at the Documentation Center for two years. Her accomplishments have been numerous, and can only be summarized here. It is the Team's opinion, however, that the present orderly and accessible condition of the library is the direct result of her work. Her accomplishments include the following: 1,500 documents placed in the CDU system, binders placed on documents, liaison with document centers in other Sahelian countries using Resadoc and Agris systems, establishment of a loaning policy, acquisition of the CDU classification system, orders made for more than 70 important works related to Sahelian forestry, provided specific training for DFF Library Scientist, and organization of INPAN library.

One contractor has been working under the PUSF Project since February, 1987 and has been focussing on reorganizing the MHE

Documentation Center. One of her main tasks has been to organize official and project documents and reference books for the Ministry. Since much of the institutional memory of a Ministry resides in its internal correspondence and reporting, we believe this to be a vital task. She has made considerable progress in developing a classification by theme system to increase accessibility to the documents. This theme system makes use of the CDU system and will make the two libraries more compatible. Her other activities since February have included transfer of documents to the PUSF library, sorting of documents into 10 categories (80%), consultations with Departments of Maradi and Zinder to assist in documentation, administrative work in support of training of Librarian in Dakar, working with Ministry of Agriculture to coordinate documentation methodology, and production of the first draft of a Forest Service Bulletin.

3.2.9. What Other Follow-On Actions Are Suggested In These Areas, Both Long and Short Term?

The most urgent action recommended is the retention of the TA counterpart in the Documentation Center. Her contract will be up at the end of September. The consequences of her loss to the project at that time have been discussed above.

## 4. INVENTORY

### 4.1 Summary

4.1.1 The scope of work for the inventory component of this evaluation specified that the following aspects of the Project be reviewed:

- Mapping for five urban areas (Niamey, Dosso, Tahoua, Maradi, and Zinder). Mapping was done at two levels:
  - Cartographic units (CUs) -Physical entities based on landform (from photos and field site descriptions), soil type (field sites) and vegetation community types (from field sites); and
  - Terrain units (TUs) - conceptual homogeneous units based on general landform, more detailed land form and configuration, and finally on soils and vegetation species composition characteristics.
- Fuelwood inventories for the 5 urban areas basically using two
  - stage cluster sampling with unequal probabilities of selection at both stages with a multiple regression estimator
- Fuelwood inventories for model sites Guesselbodi and Boyanga conducted by the model sites component of the Project.

### 4.1.2 Conclusions

- Mapping of CUs for the 5 urban areas has been completed. The concept appears to be useful. Other maps containing more useful local information could be overlaid on these CU - based maps so as to obtain a more complete picture.
  - Mapping of TUs for the 5 urban areas is still on-going. The description used is extremely vague and the concept appears too complex. There has been and will be some use of these maps in national planning and by other donor agencies
  - Recent photography should be acquired to replace the old 1975, 1979 photography being used.
- The methodology for the 5 urban areas is seriously flawed to the point that the information collected is not salvageable. The critical problem has to do with the regression estimation. It is unlikely that there is much of a relationship between fuelwood volume and percent cover and height by species as these variables were measured on the ground. The statistical analysis used to obtain the equation was also done incorrectly. It is unfortunate that the planned March, 1984,

review of the urban fuelwood inventory methodology was never implemented. This is likely not the fault of the contractor.

- The stratified sampling with cluster sampling (mapping units/stratum) with subsampling (transect areas/mapping unit) used for fuelwood estimation by the model sites project is sound, particularly the latest version. The fundamental estimation equation underlying this approach is a linear relationship between stem fuelwood volume and either stem basal area near ground level (BA) or BA multiplied by the commercial height of the stem. This is an extremely reliable relationship which has been widely accepted in the construction of volume equations throughout the world.

#### 4.1.3 Recommendations

- Resolve to the satisfaction of the DFF that the maps based on CUs, TUs and natural units are useful for their and other purposes. If so, even more time should be devoted to training Nigeriens in the use and understanding of these concepts. Perhaps the concepts can be made clearer too.
- Develop fuelwood sampling schemes for the 5 urban areas and parts thereof that yield volume estimates for potential model site areas and for the total urban area making up these potential (and actual) model sites using methodology similar to that used by the model sites project for Guesselbodi and Boyanga.
- Refine and generalize the sampling scheme used in Guesselbodi and Boyanga and train Nigeriens in the use of and implementation of the sampling scheme developed.

#### 4.2 Resources Inventory and Monitoring Section (RIM)

Two technical experts (Steve Daus and Chuck Dorjan arrived in Sept. 1982 under contract (contract IQC # PDC 1406 - I - 01 - 2083 - 00 with Tippetts, Ablett, M. Carthy and Statton (TAMS), NY, NY) to initiate RIM section efforts. The specific results from this contract period included the ordering, receipt, and filing of Landsat (LS) imagery and aerial photography. The LS imagery was in false-color infrared format at a scale of 1: 200 000, which corresponds to the scale of the topographic map sheets employed in Niger (Daus, 1986). It includes imagery from multi-spectral scanner (MSS) and return beam vidicon (RBV) systems for varying seasons over several years. It covers the whole area south of the 16th parallel.

The black and white aerial photography (9x9 inch format) included photos at 1/60 000 and 1/70 000 scales to obtain the most complete and up-to-date coverage. The photos, acquired by the Institut géographique National (IGN) for the purpose of making

topographic maps are from 1975 (1/60 000) and 1979 (1/70 000) (Daus, Ibid.). It covers the whole area south of the 16th parallel.

The personnel assigned to the RIM project at various times are shown in table 4.1.

Table 4.1. Personnel assigned to the RIM section by agency, classification, and assignment period.

<u>Individual Assignment period</u>	<u>Agency</u>	<u>Classification</u>
Issoufou Boureima 17/82 -	GON*	Forester B1
Bonbacar Sani 7/82 - 11/84	GON	Forester B1
Ibrahim Matankari 7/82 - 11/84	GON	Forester Tech
François Codjo 2/83 -	GON	Forester Tech
Guero Mamane 1/85 - present	GON	Forester B1
Mahamadou Aliou 11/84 -	GON	Socio Tech
Steven Long 11/82 - 2/84	PCU+	Forester
Cecilia Polansky 10/82 - 12/85	PCU	Forester
Joseph Tabor 3/84 -	PCU	Soil scientist
Steven Daus special. 10/82 - present	CT <sup>~</sup>	Inventory
Chuck Dorigan special. 10/82 - 4/83	CT	Inventory
Zanguina Yahaya 2/86 - present	GON	Forester
Djika Mani - present	GON	Forester
Brad Phelps 3/86 - present	PCU	Forester

\* Government of Niger, Forest and Wildlife Service

+ American Peace Corps Volunteer

~ Private consultant, Government of Niger.

There were 2 main tasks defined in the original project agreement: To produce basic soil/vegetation maps of the arable portion of Niger (the area below the 16 degree line of latitude), and to evaluate the condition of selected classified forests in Niger.

#### 4.2.1 Model Sites Section.

This section wanted fuelwood volume estimates for Guesselbodi and Boyanga. Because of some incompatibilities in objectives of surveys with the RIM section, the model sites team developed their own sampling scheme for fuelwood inventories.

#### 4.2.2 Scope of Work

The scope of work of the inventory specialist focused on mapping and fuelwood inventories done by the RIM section and fuelwood inventories conducted by the model sites section.

#### 4.2.3 National Survey Results

The tasks to be done by the RIM section-as specified in the RIP-are:

- Urban fuelwood inventory - carry on and perfect the 100 km radii urban fuelwood inventory for the five major urban centers (Niamey, Dosso, Tahoua, Maradi, Zinder) in terms of both technology and cost effectiveness for obtaining the type of information required for planning. The inventory work is to be done and published sequentially.
- Revise section workplan - after completing parts of 1) above (carefully review Niamey circle results with planning team, meeting in Niamey in March 1984 on Biometrics of Forests and Woody Vegetation in Arid lands organized by IUFRO where the urban fuelwood inventory methodology might be reviewed, engage an experienced expert on biometrics of woody vegetation in arid lands for a period of up to two weeks), a revised detailed workplan for the RIM section drawn up by the consultant in consultation with be Project Director and the consultant economist/planner.
- Cooperation with INRAN - strengthen the present cooperation with the Soils Laboratory (Labsol) of INRAN and seek complementarity of activities especially on soils information. This will be carried out with the assistance of the new Peace Corps Volunteer/soils specialist to be assigned to the section. The purpose will be to develop an ongoing relationship with INRAN and prepare a report suggesting and initiating greater complementarity of action in the broad field of land-use and natural resources planning.
- Project siting criteria - develop the relationship and logic between RIM and the model sites section for combining data and

information from both in selecting areas for future forestry development projects or activities. The process will be used to select the next model site area where that section will operate and a brief report written specifying the criteria applied and the data and information employed as a mini-model for project siting to be presented as a planning tool to the DFF and donors

- Inventory of Reserve Forests - Develop simple inventory and mapping techniques to improve the collection of data and information on the natural resources of the reserve forests (forêts classées) and carry out the inventory work on four of these forests found in the eastern part of the country and considered representative of other existing forests and brushland areas. Provide brief training on the methodology to DFF arrondissement staff to enable them to carry out the work with supervision and assistance of the section.
- Provide limited natural resource inventory assistance (generally only office consultation) for particular problems and opportunities as they arise and are within the capability of the section.

The following discussion is primarily extracted from (Daus, 1986):

Basic to any type of natural resources use planning is knowledge of the distribution, condition, and quantity of the resources. Soil/vegetation/land form (S/V/LF) base maps were generated as follows:

At the start of this reporting period (1/1/1984) these base maps have already been produced at the scales of 1/200 000 and 1/500 000 for the seven arrondissements in the department of Niamey by RIM. These products includes individual maps of each arrondissement with a legend explaining the map codes. The same procedure was used to generate additional base maps for the Dosso department and for the RIM fuelwood inventory.

Three primary ground conditions, terrain or landscape form, soil type, and vegetation community type were selected to be represented by the S/V/LF maps. They were selected because they are important in making land use or resource management decisions and the information could be obtained as follows:

-The land form was determined by photo interpretation and descriptions taken at field sites. Land form types were differentiated based on their general terrain category, relative topographic position, terrain configuration (slope, aspect, degree of dissection, etc.) and geological relationships.

-Soil types were differentiated mostly on their physical conditions, that is profile descriptions. These descriptions were made at the field site locations. Vegetation community types were differentiated primarily based on species composition, supported by cover percentages of selected species. This data was collected at field site locations.

The S/U/LF map is a mosaic of irregular-shaped polygons with which a series of numbers and a set of alpha - numeric codes is associated. These polygons are called cartographic units (CUs). Each CU is identified by a whole number, usually between one and one-hundred. The number below this, carrying a decimal fraction gives the surface area of the CU in km<sup>2</sup>. A set of additional alpha-numeric codes are called terrain units (TUs) which indicate the specific ground conditions in the CU.

Following the TU code is a whole number enclosed in parentheses which represents the percentage of the surface area of the CU occupied by the TU.

In contrast to the CU, which is a physical entity, the TU is a conceptual unit consisting of a set of homogeneous conditions (landforms, soils description and vegetation community characteristics) which occur at various locations throughout the mapped area. The physical extent of each individual occurrence is often less than 25 km<sup>2</sup>. Because the minimum mapping area is 25 km<sup>2</sup>, it was often necessary to create groups of several TU's to get areas large enough to constitute a CU. The TU's are grouped in a hierarchal classification, first based on their general land form, then more detailed land form and configuration, and finally on soils and vegetation species composition characteristics. The individual TU descriptions are composed of their alpha - numeric code and detailed descriptions of the ground conditions associated with the TU. The code has three numbers indicating its place in the hierarchy and two letters which indicate soil depth and general humidity conditions of the field in the particular TU. The descriptions include listing of the attributes regarding general land form and specific terrain configurations, a "typical" soil profile description, a list of species with their associated cover percentages found on a "typical" site, the specific field sites used to establish the unit, a species matrix showing all vegetation species found at each one of the field sites, and if available an estimation of the mean fuelwood volume from a "typical" site. At the end of the reporting period 114 separate TU'S were established and described.

To produce the S/U/LF base map, the area is divided into logical units with respect to the three basic mapping criteria using Landsat imagery because differences in image characteristics do correspond to differences in ground conditions constituting the mapping criteria. Lines were drawn around zones of similar reflectance characteristics on sheets of clear drafting film placed

on the Landsat image. These zones, corresponding to the CU's, are either completely homogeneous or are made up of a consistent mix of different reflectance types. Ground data sites were then selected so as to be representative of all the Landsat reflectance types observed in the images of the areas to be mapped. Several ground data collection sites were located in each of the Landsat reflectance types to determine the variability of the associated ground conditions. In generating base maps, priorities were given to those sites easily accessible by vehicles.

Field sites selected for visitation were transferred to the aerial photography for use in navigation in the field. Each site was located by vehicle, first using the 1/200 000 IGN topographic maps for gross navigation and then the aerial photos for actual location of the site. The soils were described and a comprehensive vegetation species list was made at each site, as well as other information regarding terrain characteristics, present land use, and site conditions.

The field sites for an area are sorted by their general terrain type using the appearance of the site location on the aerial photos and the descriptions taken in the field. Further refinement is made using ancillary terrain configurations and condition data, soils description and vegetation species composition and cover percentage information. Field sites with similar terrain, soils, and vegetation characteristics were grouped into TU's. All field sites were identified with a terrain unit.

On the LS image the ground conditions observed at the field site locations are noted by recording the TU alpha-numeric code and comparing it to the LS reflectance type in which it falls. The color, pattern, etc. of the LS reflectance and the variability of the reflectance between locations within the same TU are noted. This is used to note greater or lesser confidence in using LS reflectance to represent TU's. (A new mapping unit "Natural region" is currently being developed to map Niger. It is not clear how this fits in with the concepts of CU and TU discussed above).

The concept of a TU is clarified and expanded in Daus (1986).

The actual map produced uses the LS reflectance types appearing in each of the CU's, assuming they represent individual TU's, placing the alpha-numeric code on the map overlay sheet corresponding to each TU represented, and estimating the total percentage of the CU occupied by each TU. The sampling scheme for fuelwood estimation is described for the Niamey urban zone where it was developed. The S/U/LF base map generated in the mapping phase (phase I) at a scale of 1:200.000 was separated into 340 10 km x 10 km squares, the primary sample units (PSU's).

PSU's with larger proportions of "forestry types" were to be selected with higher probabilities (called biased sampling in Daus

[Ibid.])). To quantify this concept, the following procedures was used:

- A relative forestry value (FU) was calculated for each terrain unit based on fuelwood species present, their cover percentages, present land use, and various site and environment characteristics. These values ranged from -2 to 14
- An average FU value was computed for each CU unit (is this a simple or weighted average?)
- A weighted average FU value was computed for each p.s.u. based on average percentages of each CU in each psu.

25 PSU's were then selected proportional to their FU values by randomly selecting 25 numbers from the cumulated FU values

Within each of the 25 primary sampling units, three secondary sample units (1 km x 1 km) were selected, again with different probabilities of selection. The limits of each selected psu were drawn on the aerial photos for full stereo coverage of the psu. A grid, with each square representing one of the possible ssu's was placed on the photo and each of the 100 ssu's was interpreted for TU's evident, the relative area of each TU, the FU of each TU, and a rough estimate of the vegetation cover percentage by TU. A weighted total was computed for each ssu and 3 ssu's were selected proportional to their FU value using 3 random numbers from the cumulated FU-values. A nine-point grid fitting the boundaries of a ssu was used to randomly select 1 location. This location was marked on the aerial photograph. At each of the 75 locations, the following sampling scheme was used (using notes from interview):

- a 100 m long line is established in each of the 4 cardinal directions, 2m wide.
- measure cover percentage (CP), average height ( $H_a$ ), and variability in height for Guiera senegalensis, Combretum micranthum, Combretum nigricans, Combretum glutinosum, Balanites aegyptiaca, Acacia spp., Boscia spp., and other species. Cover percentage was tallied as percentage of hits by the species at each 1m interval at which a pole was set, no more than one touch per species at each location. At each 1m location the maximum height of touch for the species was also recorded. These independent variables were used because it was thought that those same variables could be measured from the aerial photographs.

The above-collected information for the 75 sample units were used in a multiple regression equation established as follows: 92 2x100 line transects in the Niamey population were picked in such a (subjective) manner that their frequency was balanced over a matrix using terrain unit and cover percentage as rows and columns. All ligneous vegetation species rooted within the transect area were cut

and total biomass and fuelwood by species were determined. Fuelwood volume was obtained by assuming a linear relationship between fuelwood weight and resulting volume and assuming 250kg/stere of fuelwood. Previously a multiple regression equation had been developed between fuelwood weight and 19 independent variables selected from a larger list of the measured variables and transformations thereof. Variables were selected on the basis of stepwise regression. Subsequently 46 observations were deleted as constituting "wild" values which meant that they represented atypical values of the dependent and independent variables. The regression equation is given in Table 4.2. The  $R^2$  is .998, and the standard error expressed as percent of the mean is 8.2 %.

Table 4.2. Independent Variables, Their Regression Coefficients and Partial T-Values

<u>Variable</u>	<u>Regression</u>	<u>T-Value</u>
Constant	0.724	.45
cover percentage (CP) all species	377.17	6.47
C p <sup>2</sup>	- 359.86	-6.64
C p <sup>3</sup>	1 216.44	4.50
mean height of intersections all species	-2.02	-1.59
C P (G. S.) (CPG)	- 357.19	-6.40
C P <sup>2</sup> for G.S.	719.38	2.47
C P <sup>3</sup> for G.S.	- 1 641.36	-3.66
mean intersection height G.S.	7.46	6.40
height intersection variability G.S.	- 7.22	-3.35
C P for C.M.	-684.46	-10.35
C P <sup>2</sup> for C.M.	4 583.73	11.72
C P <sup>3</sup> for C.M.	- 9 072.45	-12.86
mean intersection height C.M.	2.48	2.04
height intersection variability C.M.	8.71	3.17
C P <sup>3</sup> for C.N.	-1 887.31	-21.39
mean intersection height C.N.	2.92	3.66
height intersection variability C.N.	-12.15	-6.38
C P Boscia spp.	38.43	0.61
C P Acacia spp.	- 554.37	- 18.12

G.S. - Guiera Senegalensis  
C.M. - Combretum Micranthum  
C.N. - Combretum Nigricans

Two estimation procedures were used:

- The 75 weight estimates were converted to stores/km<sup>2</sup> a simple average was taken, and this average was multiplied by 31,000 to obtain an estimate of total volume for the Niamey urban zone.
- The 75 volume (or weight) estimates are poststratified by determining what TU they belong to, so that the sampling design is treated as if a fixed random sample of transects was selected in each TU stratum sampled. No weight estimates are available for those TU's in which no sample units fell. Total volume estimates are generated for the TU's sampled and these estimates are summed to generate an overall estimate. In Niamey, the sampled TU's constitute 77 % of the total area. Instead of a simple mean of 75 values, the 75 values are combined into a weighted mean with weights being proportional to the area of their TU.

#### 4.3 Questions and Answers Concerning Natural Resource Inventory Issues

##### 4.3.1 Has the urban fuelwood inventory been satisfactorily completed? What are the strengths and weaknesses of the final results? What practical applications can these results have?

The statistical methodology used is seriously flawed, and new techniques will have to be used. However, the most obvious advantage of the work to date is the existence of a large body of field collected data. A total of 312 sites have been sampled where cover percentage and height data has been collected. These data do give initial indications of cover percentage variabilities to be expected in the population. There also exists another 92 sites where transect data were collected and, for a corridor associated with the transect, weights for ligneous biomass and fuelwood. Regardless of the present manner in which these data have been analysed they still represent some of the only actual data in existence for the Sahel, and as such, have a high value with respect to guiding subsequent survey or inventory efforts.

The production of the base maps is actually the primary activity of the RIM section, both from the standpoint of furnishing base line data for the planning purposes and in terms of training and technology transfer. When the project was initially implemented there did not exist for Niger any baseline information concerning the geographical distribution, nor condition, of forestry related natural resources. In addition there was not a group of appropriately trained technical or professional level people who could produce such maps and use them to initiate coordinated planning activities.

4.3.2 Has the inventory of the "Forêts Classées" produced the expected results? How will this work be applied in the future?

These forests have been located only in Zinder (by the FLUP) project and in Tahoua (by a German volunteer working with the District). It is very difficult to find these forests since description available to relocate them are quite inadequate. These areas tend to be highly degraded, are not particularly useful for management purposes, and should probably not be distinguished from other forests as potential management sites. The section has done the work that needed to be done on this.

From the standpoint of an individual activity of the RIM, the assessment model developed for the classified forest system has the greatest possibility of being duplicated by the DFF. Section personnel completed initial trial applications of the survey methodology on the classified forests of Say and Fogha Beri. The procedure was modified and refined upon review of these initial efforts and an operational level application was completed. This effort involved the condition assessment of the 27 classified forests in the department of Zinder.

4.3.3 To what extent does the Section's revised workplan, as stated in the planning unit's organization and implementation plan, satisfy project objectives and the fourth amendment?

Satisfactorily.

4.3.4 To what extent has this workplan been fulfilled?

If the methodology used had not been seriously flawed, the work plan would have been fulfilled admirably. The unit has done a tremendous amount of work. Judgment on the mapping is still out. Considerable work has been done and it is quite possible that this is very useful. Procedures and use should be carefully documented.

4.3.5 How functional and how effective are the working relationships between the Inventory Section and the SPD in the resource inventory area?

They appear to be nonexistent since the SPD is not yet an operational unit. However, reference to the work with the SPD should take into account all of the activities of the RIM section in preparation for the service to be brought into existence: training of personnel, definition of activities, developing political and administrative contexts, defining logistical support needs and budgeting, furnishing equipment, and providing technical consultation when required.

These preparatory activities started back in early 1986 with the definition of terms of reference for Peace Corps, German, and other cooperating volunteers who were being programmed to fill the departmental positions.

4.3.6 To what extent will the SPD be able to perform its resource inventory tasks without external support?

It will be able to do vegetation mapping only. It needs external support for soils and landform mapping and for fuelwood inventories.

4.3.7 Are the resource inventory systems being developed adequate for Niger's needs? Will additional efforts be necessary, and if so in what specific aspects?

No. Resource inventory systems are adequate only for Niger's immediate needs. The fuelwood survey approach developed by the model sites team needs to be integrated with the mapping effort of the inventory and mapping team, range + forage surveys need to be developed further, and growth and mortality studies should be started.

However, data already collected and various products already generated have been used extensively even though they are still in their unfinished stages. The list of people/organizations which have already benefited include:

Niamey Department Development (NDD) project. A zonation team used RIM developed base maps and RIM supplied satellite images, aerial photographs, equipment and personnel in order to do a stratification of the Niamey department with regards to classes of agricultural lands.

Model Sites section of the FLUP project, John Heermans, Greg Minnick, et. al. Two site selection applications: Boyanga and Baban N'Rafi.

German Development Bank (KFW), used S/U/FT base maps in Niamey zone for evaluating forested surface area which is manageable under provisions of a proposed project.

Andeke Lengui, FAO, has used S/U/FT maps of Niamey and Maradi-Zinder zone for locating potential sites for forestry management projects.

4.3.8 Are Nigerien professionals being adequately trained in the use of resource inventory techniques? Do they have the necessary technical background?

In terms of statistical and biometric methodologies, the Nigeriens are not being adequately trained because they lack the

mathematical background. A graduate in mathematics from Niamey university should be sent to the United States or Europe for a Masters degree in applied statistics.

Throughout the base maps generation procedure, which included: approach definition and eventual refinement, gathering of field data, interpretation of various forms of base data, analysis of this interpreted data, elaboration of the final map product and the issuance of reports, Nigerien personnel were trained in the philosophy and techniques and methods used. Due to the posting patterns of the Nigerien forest service, personnel were rotated, and this led to the distribution of RIM-trained personnel to other posts in the field.

The section has done an excellent job at training the Nigerien counter-parts given their background. The Nigeriens in this section seem well motivated and were complemented on their capabilities by various sources.

The assessment model report of the classified forest system is composed of two principal parts, each designed to train DFF personnel so that they can carry out similar assessments independently. The first part of the report is basically a procedural manual, detailing the method applied, step-by-step, the rationale behind each step and the formats of the various output products (the report and accompanying maps). The second part of the document contains the actual reports for the 27 classified forests in the department. The desired end result is that Nigerien DFF personnel can reproduce them as they conduct their own similar types of surveys or assessments.

There are several Nigeriens who could plan and implement most of the field aspects of the survey, both within and outside the section.

There exists in the Nigerien forest service a group of technicians who are not familiar with the basic process and some of the specific methods of doing a quantitative inventory. The people are now much more conscious of: the differing types of information needs common to forestry inventory; the effect of real life constraints on the inventory process; how designs and approaches are developed in consideration of these constraints; what are some of the basic assumptions and data collection and analysis procedures; and what are some of the eventual uses of the information.

Those documents being produced by the RIM section, the base S/U/LF maps, associated reports, speciality or thematic maps, etc. are designed to be useful at the two levels: national and local. In the training area through various formal training courses, workshops and internships Nigerien forest service personnel have been trained to the extent possible in the philosophy, methods and applications of resource surveys.

4.3.9 Does the scope of work of the technical advisor represent project goals and objectives? To what extent has he satisfied his scope of work?

If methodology had not been flawed, the project goals and objectives for national purposes would have been well satisfied. The model sites project and the inventory project could have meshed their needs for fuelwood volume inventories easily but this was not done because of failure of communication and leadership from the top.

4.3.10 What recommendations can be made regarding an effective total transfer of resource inventory responsibilities to Nigerien professionals?

It is likely that an additional 2-3 years is needed for such effective transfer. A competent inventory specialist statistician is needed to develop a complete system of fuelwood, forage, and range inventory systems and growth and mortality studies; and to get Nigeriens trained. To get an adequate background in statistics requires as minimum of 2 years of statistics training at a university.

With respect to forestry related resources, the soil/vegetation/land form (S/V/LF) base maps, have proven to be effective in providing information to users. The basic product is in the form of maps showing the geographical distribution of related sets of ground conditions throughout the study area (that below the 16th parallel). The maps are being published at a scale of 1/200,000 which is the scale at which the standardized topographic maps are made available by the French Institut Geographique National.

4.3.11 What other follow-up actions are suggested in the inventory area, both long-and short-term?

The main requirements are the ones already suggested. A highly competent expatriate inventory specialist - statistician is needed to develop better sampling strategies, to sign off on any proposed studies, and to train Nigeriens with adequate statistical training as they become available.

4.4. Conclusions

4.4.1 National Survey

The basic document (Daus, 1986)) is well written and contains considerable useful detail. The concept of cartographic unit (CU) seems pretty well defined and may be useful in national planning. The Nigeriens in the project felt comfortable about their ability to do the vegetation part of the mapping but felt they still need help with the soil and landform portions of the mapping system. The concept of terrain units (TU) used as a follow-up mapping procedure to the cartographic units mapping (a CU may consist of one or more

TU's) seems nebulous and may not survive the departure of the person who conceived it. This work is still going on and if this is to be continued the key question needs to be addressed by the Nigeriens: "how useful and understandable is this concept"? Considerable effort has gone into this and careful documentation of uses of the actual maps is needed.

Useful products that developed as part of this effort are a mapping legend and a photo key where "typical" areas on photos are visited and sketched on the ground and descriptions of both given. This is done by the American contractor in English and by a Nigerien in French.

The fuelwood survey part of the National inventory is fraught with serious errors. The most serious problems, which are unlikely to be remediable by reanalyzing the present data collected, are with the regression equation. The following serious reservations can be raised regarding this equation:

- The sample collected for developing the equation is unlikely to be representative of actual conditions prevailing in the field even in the Niamey urban area.
- It is unlikely that there is much if any relationship between fuelwood volume and the independent variables (% cover, average height) used. This is because fuelwood volume is for trees rooted within the 100 m x 2 m transect area and the percent cover and height are sampled variables for trees reaching within the line of measurement (which are often likely to be trees not rooted within the zone) and because one can expect a lot of sampling error and measurement error in measuring independent variables.
- The regression equation is based on 19 regression variables for only 46 observations (Table 4.2). High correlations can be expected between the independent variables which leads to coefficients being estimated very unreliably. Some of this shows up clearly in the equation developed. It seems rather strange that fuelwood volume would decrease with an increase of occurrence in Acacia species and Combretum nigricans, yet that is what the equation tells us.
- In the development of the regression equation "bad" observations were thrown away (hence the reduction from 92 to 46 observations). This was done on the basis of atypical observations. Such a procedure has to be used with extreme caution and might lead to the elimination of maybe a few clear errors (for example a negative or impossibly large fuelwood volume observation) but not of 50 percent of the data. This leads to an equation which is not applicable for use with other data (such as the 75 transects) where only cover percentage and

heights are measured so that similar 'bad' observations can not be deleted because corresponding fuelwood volumes are unknown.

The 75 transects were selected with unequal probabilities. This can be corrected for as long as the actual probabilities of selection are known. A serious problem that can not be corrected for is that TU's that have negative or zero FV - values have no chance of being selected in the sample. In any case, neither method 1 or 2 method used, properly corrects for differences in probabilities of selection. Since the basic regression equation used is completely unreliable, one can not say any thing about whether method 1 or method 2 estimates are biased in which direction.

#### 4.4.2. Fuelwood Inventories (Model Sites)

To satisfy model site needs, special fuelwood inventories were conducted in some cases by model sites personnel. The fuelwood inventory conducted in Guessebodi in 1985-1986 (Heermans and Minnick, 1987) was done as follows:

- Develop dry weight regression equations for each commercial species (CM = Combretum micrathum; CN = Combretum nigricans; and GS = (Guiera Senegalensis) using the weighted average diameters of stems in a tree as independent variable

( $D = D_w^2 + D_n^2$  where  $D_w$  = weighted average tree diameter,  $D_i$  = diameter of stem  $i$  ( $i=1, \dots, n$ ) on the tree ( $D_i \geq 4$  cm for CN and CM,  $D_i \geq 3$  cm for GS) The basic equation used a logarithmic transformation of both the dependent and independent variables. The resulting regression results were then transformed back to the original equation and a standard bias correction technique was applied in estimation.

How the trees were selected, was not indicated. For each tree, the species, whether alive or dead, and number of stems satisfying the minimum diameter requirement were recorded. Dry weight of a tree was obtained by weighing the green tree to the nearest 200 grams when cut to the appropriate minimum diameter and cutting, weighing, and oven-drying (105 ° C for 48 hours) a number of segments ranging in diameter from 4 - 7 cm.

More complex equations using other variables (transformations of the diameters and tree crown diameter were tried as independent variables but are not discussed here since they were not used. Only live trees (all stems, whether dead or alive) were used in the development of the equations.

#### -- Sample Selection Scheme

2034 out of 5 000 ha in the forest were considered to have significant standing volume of firewood and a low erosion risk

factor. This area was further stratified into 4 strata based on percent crown cover and vegetative growth patterns as interpreted from 1984 1:20000 black and white aerial photographs. Each stratum consisted of numerous mapping units, the areas of each of which was measured with the dot grid method (Heermans and Minnick, op. cit.). The areas of the strata were 207 ha, 466 ha, 511 ha, and 850 ha respectively. Within each stratum three mapping units were randomly selected, a transect was drawn over a typical cross-section on the aerial photo, and 10 circular 5 - m radius plots (78.54 m<sup>2</sup>/plot) were placed at equal distances along each transect. Within each plot the independent variable was measured for every live tree for the three species. In the case of trees straddling the plot boundary, every other one was included in the observations for that plot.

In statistical terminology the sample selection scheme is called stratified sampling (4 strata) with cluster sampling (3 mapping units/stratum) with subsampling (10 plots/mapping unit).

The estimated fuelwood volumes with standard errors for the 4 strata and overall in Guesselbodi are given in annex III (pp 137 - 139) of Heermans and Minnick (Ibid.).

#### 4.5. Recommendations

##### 4.5.1 National Survey

- In mapping, the remaining time should be devoted to training the Nigeriens in the use and understanding of the cartographic units (CU's) terrain units, and the more recent concept of natural regions and thorough documentation of what has been done in that area.
- Carefully document the uses of the mapping information.
- Recent photography should be acquired to replace the old (1975, 1979) photography used.
- The fuelwood survey estimation as currently being implemented should be scrapped completely since it is erroneous.
- A fuelwood survey as currently being implemented by the model sites team in Bayanga and Guesselbodi should be used. The heart of this sampling scheme is a fuelwood volume prediction equation using individual stem diameters near the base for live trees as prediction variable. This yields a very reliable prediction equation.

##### 4.5.2 Fuelwood Survey

- Regression equations of the type  $y = a + b x$  where  $y$  = fuelwood volume and  $x$  = stem diameter squared should be developed for

other species being used for fuelwood in the five urban areas. Commercial height may help improve the relationship.

- The sampling technique in which only the diameter information is collected on transect areas in the field should be refined. From a statistical point of view it is likely to be best to visit a large number of mapping units, taking 2 transects/mapping unit.

#### 4.5.3. Survey for National and Site Specific Purposes

- A fuelwood volume survey should be developed which uses possible model sites within an urban area as strata. In this way fuelwood volume estimates can be generated for both potential model sites and the entire urban area.
- Close collaboration between the national inventory and mapping unit and the model sites units should be encouraged.

## 5. FOLLOW-UP RECOMMENDATIONS

### 5.1 Forest Land-Use Planning (FLUP) As a Component of Comprehensive Land-Use Management For Sustained Production of Food, Forage, Wood, and Minor Products

Niger has the advantage of having models for a variety of interventions that are having an enduring impact on smallholder productivity. We suggest that USAID assist the GON to take the opportunity to use this diversity of expertise to implement a comprehensive land-use planning program.

Besides the FLUP models at Guesselbodi and Gaya, the evaluation team observed windbreaks (Majjia and west of Maradi), living hedges, and Acacia albida intercrop plantings at Madaroumfa and Dosso. Individually, each intervention has had effective but limited impacts on smallholder basic needs. Collectively, they are components for a comprehensive land-use management plan that would be economically and ecologically viable.

The FLUP approach has shown that natural forest stands can be managed for sustained production of wood, forage and minor products. However, in the context of a land-use plan for a village or a group of villages, additional measures are required to ensure that agricultural land remains productive. If the land upon which farmers depend for food is degraded, there will be pressure to move food production to the restored natural forest area. The other interventions are similar in meeting some basic needs, but not all.

For example, in the Babban Rafi Forest proposed to be placed under a forest land-use plan, measures taken now to establish living hedges, windbreaks, and field trees (A. albida, Parkia biglobosa, etc.) will stabilize the productivity of the agricultural lands. (To answer the obvious question of why the indigenous field tree species are not abundant in the Babban Rafi forest, both species mentioned above generally are part of a succession that begins with agricultural exploitation. Much of the Babban Rafi forest has been put in cultivation within the last generation.)

Components from each of the above interventions would include the following:

FLUP Model. Controlled access to range lands; shared stewardship based upon a land-use plan; use of multiple-purpose species; reinvestment of a portion of revenues from harvests of the resources; and, use of soil and water conserving technologies. (Models at Guesselbodi and Gaya.)

Windbreaks. Use of multi-purpose trees for crop protection and pole production; use of guards for protection instead of fences; and, private nurseries. (Models in Majjia Valley.)

Living-hedges. Use of multiple-purpose species to replace dead thorn fences and provision of sustained yields of forage and wood. (Some species planted in rows ten meters apart may be managed as alley trees for soil enrichment as well as wood and forage production.) Models in Majjia Valley.

Field Tree Plantings. Establishment of field trees as a permanent intercrop in millet and sorghum lands; and, remuneration of farmers for protective devices fabricated for surviving trees. (Model at Dosso in the UNSO project.)

## 5.2 Revolving Fund for Natural Forest Restoration

One of the anticipated constraints to extending the FLUP approach to other parts of Niger is the funds for site restoration. While it is anticipated that the revenues generated from the sale of wood and forage will pay the recurring operational costs of protecting and managing the forest, it is not clear that revenues will cover restoration costs during the first one or two rotations in all cases (see section 3.1.1 on discussion of Boyanga).

A second issue that will need to be considered by a design team for a following phase for FLUP is the impact of the salaries paid for restoration on the technical success at Guesselbodi. Seven years after the FLUP project was initiated, the primary income to the Woodcutter's Association members is still the salaries paid to them for restoration work by the project. While we argue that the Guesselbodi site was exceptionally degraded and the salaries paid at Guesselbodi were a viable investment in terms of producing a model for natural forest management, it is not clear that this level of expenditure can be sustained in many more places.

Providing a revolving fund for a comprehensive land-use management may provide a means to cover restoration costs on a loan basis. As calculated in section 3.1.1, a loan for the restoration of Boyanga could be paid back in 20 years without undue hardship. These funds would be available to be used for restoration in other areas.

It may be logical to expand the use of this revolving fund to other activities in a comprehensive land-use management plan such as windbreaks, living hedges, and field trees. These activities would provide additional revenues for repayment. For example, the poles from the Majjia Valley windbreaks provide a substantial income part of which may provide revenue for local management purposes a la the Guesselbodi Model.

However, the revolving fund approach has drawbacks. First, villages receiving loans will have to have some money-making activities to generate sufficient revenue. The Guesselbodi enterprise has a convenient market for fuelwood and forage, and we

can not expect this to be the situation in all areas. Second, managing a revolving fund will require time and effort to set up and monitor accounts. But, the Woodcutter's Cooperative has shown that, in some cases, revenues generated from rational management of natural resources are sufficient to provide a profit and support management costs. If a revolving fund is established, it will be a matter of selecting appropriate sites that are economically viable.

### 5.3 Tree Improvement

Tree species that have evolved in the Sahel climate are some of the best suited for growing in this environment, and they are the trees most accepted and used by local populations. Likewise, agroforestry technologies evolved by farmers using local species have been developed over many years of trial and error. However, these technologies and the growth rates obtained from planted trees can be greatly improved by introducing selected modern techniques, such as tree improvement and principles of forest genetics. What follows is a suggested method for instituting an applied tree improvement research program with native species that can produce improved seed for agroforestry, enrichment plantings, or block plantations (e.g., farm woodlots). This program can be used for any species, but Gao (Acacia albida) will be used as an example.

The first step involves the acquisition of good seed to enhance growth rates and reduce the variability in form. This can be accomplished by selecting the best trees growing in plantations or in natural stands to be seed trees. An essential prerequisite for this is the development of selection criteria which are based on the final product one wishes to produce. A tree selected for fuelwood production will have different criteria as compared to one selected for pole production or even fodder production. A second requirement is to adequately mark and map the location of each tree. This will facilitate future seed collections and the gathering of seed or vegetative material for further tree improvement work. In natural forests, where natural regeneration is the form of management, efforts must be made to select good genetic quality seed trees, so that the quality of the resulting forest is acceptable. This first phase takes one to two years, and average genetic gains in volume growth are approximately five percent.

The second step is seed orchard establishment. This involves implementing more stringent tree selection criteria, and no more than one or two trees should be selected from one tree stand to avoid inbreeding caused by the collection of related individuals. These selected trees are placed in seed orchards where they can interbreed. Seed orchards should be located in sites with easy access, no competing land use (good seed orchards will be on a site for as much as 50 years), isolated from contaminating pollen sources, with good water and moderate soils. The selection, establishment, and management of seed orchards is a science unto

itself, and there are many books on this topic published by the USDA Forest Service.) Seed orchards can be either grafted or from seedlings, but with fast maturing hardwood trees, seedlings, seed orchards are generally the rule. Controlled breeding using specific designs, is done within the orchard, and the seed produced from these crosses are used too establish progeny tests. Gains in volume production should be 25 percent above yields obtained from natural forests, and this phase should take 10 to 12 years.

The third step involves the analysis of progeny tests, and using the resulting information to weed out genetically inferior trees from the first generation seed orchards. This produces a 1.5 generation seed orchard with gains in volume growth being about 35 to 40 percent. These gains can be obtained within 12 to 18 years.

Future generations of tree improvement can be undertaken by repeating this cycle. Material for advanced generation orchards is generally obtained from progeny test material and occasionally outstanding individuals from wild populations. Those tree species, such as Gao, which have a wide distribution, readily lend themselves to adding individuals from different ecotypes, thereby increasing genetic variability within the breeding population.

#### 5.4 Job description Forest Biometrician

- Develop efficient sampling strategies for estimating fuelwood volume and other timber product parameters for model sites, potential model sites, and urban areas (100 km radius)
- Develop monitoring systems for determining growth, yield and mortality estimates for model sites, potential model sites, and urban areas.
- Consult on and sign off on other proposed studies within the FLUP Project.
- Increase awareness of the scientific method and use of micro computers through work shops, short courses, training tapes, etc.
- Maintain awareness of developments in statistics, forest biometry, and computer science by acquiring additional training at symposia, workshops, etc.

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Appendix A    Niger Forestry and Land-Use Planning Project  
(No. 683-0230) Evaluation Statement of Work.  
Source:    PIO/T No. 683-0230-3-

Summary

The evaluation will be carried out in September, 1987 by a team consisting of expatriate specialists, and representatives of the Government of Niger (to be named) who have no direct connection with the project. The expatriate consultants will be responsible for writing of the formal evaluation report, and of the internal AID evaluation summary, prior to departure from Niger. The evaluation team members, their disciplines, and their respective duties are as follows:

A.    Team Leader

The team leader will be expected to provide guidance to the team on A.I.D. policy, and to assure completion of a report responsive to the guidelines in this Statement of Work, within the time limits set by USAID. The team leader and team members shall decide among themselves on responsibility for particular subjects or sections of the study and report. Assignments will be indicated in a draft outline of the report (approval to problem), to be submitted for approach to USAID within one week of arrival in country.

The team leader will also assure that general questions will be addressed regarding objectives, outputs, and the relevance, effectiveness, efficiency, impact, and sustainability of the Project in total.

1.    Objectives

The study is to be both retrospective and prospective in approach. The evaluation will analyze project performance in meeting project goal and purpose, and will attempt to assess project impact using available quantitative and qualitative indices. Secondly, and equally importantly, the evaluation team will make specific, substantive recommendations to USAID and the government on activities, programs, policies to pursue in future collaboration.

More specifically, the evaluation will:

- a)    Assess progress towards attaining goal and purpose of the project. What indicators of progress can be cited in analyzing project performance and impact? Were defined goal and purpose (in the 1983 redesign) appropriate? Are assumptions at purpose an goal level still valid?
- b)    Evaluate performance of the project in completing planned outputs. Comment on appropriateness of projected outputs. Indicate whether unanticipated outputs were achieved and identify them.

- c) Assess performance in delivery of inputs by AID, contractors and government of Niger.
- d) Indicate the measure of impact the project has had on the Niger government approach to natural resources management in terms of strategy development, practical activity orientation, influence on other donor programs, and government official understanding of effective anti-desertification techniques, and the importance of this input on the long-term (20-30 yr.) development goals for Niger.
- e) Recommend specific policies, programs and activities which could be pursued successfully in the near-(1-5) and medium-term (5-10 years) to further fulfillment of goals in the subsector. Recommendations are to be as specific ("actionable ") as possible, and may suggest bilateral, regional or multi-donor approaches to assistance.

## 2. General questions to be Addressed

- a) Relevance: Are the development constraints that the project was originally designed to address major problems supported by A.I.D.? Does the project reflect development priorities of the Country Development Strategy Statement CDSS for Niger? Does it reflect A.I.D. worldwide policy for natural resources management/biological diversity?
- b) Effectiveness: Is the project achieving satisfactory progress toward its stated objectives? Note: The evaluation team must clearly state its working definition of "Satisfactory" used in assessing effectiveness. Can progress be measured in quantifiable terms. What qualitative measures of progress exist?
- c) Efficiency: Are the effects of the project being produced at an acceptable cost compared with alternative approaches to accomplishing the same objectives? Are sufficient data available on the project, and on alternative approaches, to be able to make quantifiably valid statements on efficiency? In a future activity, how could such data be obtained?
- d) Impact: What positive and negative effects are resulting from the Project? Are there measurable impacts from the project?
- e) Sustainability: Are the effects of the Project likely to become sustainable development impacts, that is will they continue after A.I.D. bilateral funding has stopped? The evaluation needs to be particularly critical and objective on this issue.

### 3. Planned Project Outputs

The chief output of the project to which each project component is to contribute, is development of a well organized and functional planning unit which is integrated into the structure of the DFF and which has a direct and meaningful impact on budgeting and planning in the natural resources sector." (Revised Annex I, Grant Agreement).

Specific outputs planned are as follow:

- a) 3 managed model sites established and functional to test forestry techniques, provide a sustainable supply of products and serve as field training examples;
- b) 5 fuelwood inventories, one hundred km. in diameter around the major urban centers carried out by a functional inventory section able to furnish relevant information to planners;
- c) a documentation center set up to classify and store data and information useful in land use planning;
- d) a strategic planning service able to tie information and policies together in a form useful to decision makers;
- e) 8 trained foresters (BS and MS level);
- f) creation of a technical planning unit, Being staffed by qualified Nigeriens, and an organizational plan developed for its complete integration into the activities of the forest service (conditions precedent to PACD extension and LOP increase).

### B. Forest Economist

The forest economist must have a PhD in economics with specialty in forest economics. The individual must have experience in tropical forest development, must have a technical knowledge of forest management, economics and planning, and institutional development, and must have proven understanding of private enterprise development in a rural context. Preference will be given to candidates with French language ability, with more than five years professional experience, and with work experience in Africa (particularly Sahelian Africa). However, because of the highly specialized nature of this academic field, candidates with superior technical qualifications who do not have any or all to the above (language facility, etc.) will be given full consideration. The project will supply interpreter services, if necessary.

1. Questions concerning planning issues

- a) To what extent does the planning unit's organization and implementation plan satisfy the requirements of the Fourth Amendment? Have there been any major changes, and if so, are they justified?
- b) To what does the reorganization of the Forest Service, the assignments of personnel and the planning unit's implementation plan satisfy the conditions precedent set out in the Fifth Amendment?
- c) How functional and how effective are the working relationships between the "Service de la Planification et de la Documentation" SPD-(Forest Service's planning Unit) and the project?
- d) To what extent will the SPD be able to perform its duties without external support?
- e) Are the planning systems and procedures being developed adequate for Niger's forest sector needs? Do the systems and procedures constitute a complete set of planning tools?
- f) Are the Nigerien professionals being properly trained in the use of these tools?
- g) Although the Cellules Departementales de planification Forestière were not considered in the Fourth Amendment, they have been created and are becoming operational. Do they constitute, as designed and funded, a relevant part of the natural resource planning process?
- h) To what extent do the analytical procedures, planning systems and studies developed to date satisfy project goals?
- i) Does the scope of work of the technical advisor represent project goals and objectives? To what extent has he satisfied his scope of work?
- j) What recommendations can be made regarding an effective total transfer of forest resource planning responsibilities to Nigerien professionals?
- k) What other follow-on actions are suggested in the planning area, both long- and short term?

2. Questions concerning project management

- a) Have adequately trained counterparts been made available as planned?

- b) What has been the operational relationship, and what problems have been encountered in integrating the project into the SPD?
- c) Have technical advisors been used in ways conforming to agreed plans? Has staffing been appropriate to needs? Are work plans realistic?
- d) If a major follow-on effort is anticipated, what are recommendations for technical advisor positions? Timeframe?
- e) Is information on Project finances available on a timely and complete basis to project implementators? Are financial management and reporting practices adequate to project needs?
- f) Are the lessons learned being adequately documented?
- g) Has GON Funding, especially counterpart funds, been provided on schedule? Were expectations of counterpart funding realistic? Has use of ASDG Counterpart Funds contributed to realization of project goal, purpose, outputs? In what way and to what extent? How could planning and programming of local currency resources be improved.
- h) Has the level of communication between the project and the A.I.D. Mission facilitated efficient management of the Project?
- j) How does the cost of different types of operations compare with the Project's expenditures budget?
- k) A decision was made not to hire a sociologist. As a result, as number of tasks concerning social studies were not performed. Was this decision justified, or did it impair the project's progress toward its major objectives?

C. Resource Inventory Specialist

The resource inventory specialist must have extensive experience in photo and satellite data interpretation and a graduate degree in biometry.

Preference will be given to candidates with French language ability, with more than five years professional experience, and with work experience in Africa (particularly Sahelian Africa). However, because of the highly specialized nature of this technical field, candidates with superior technical qualifications who do not have any or all of the above (language facility, etc.) will be given full consideration. The project will supply interpreter services, if necessary.

1. Questions concerning natural resource inventory issues

- a) Has the urban fuelwood inventory been satisfactorily completed? What are the strengths and weaknesses of the final results? What practical applications can these results have?
- b) Has the inventory of the "Forêts Classées" produced the expected results? How will this work be applied in the future?
- c) To what extent does the Sections's revised workplan, as stated in the planning unit's organization and implementation plan, satisfy project objectives and the Fourth Amendment?
- d) To what extent has this work plan been fulfilled?
- e) How functional and how effective are the working relationships between the Inventory Section and the SPD in the resource inventory area?
- f) To What extent will the SPD be able to perform its resource inventory tasks without external support?
- g) Are the resource inventory systems being developed adequate for Niger's needs. Will additional efforts be necessary, and if so in what specific aspects?
- h) Are Nigerien professionals being adequately trained in the use of resource inventory techniques? Do they have the necessary technical background?
- i) Does the scope of work of the technical advisor represent project goals and objectives? To what extent has he satisfied his scope of work?
- k) What other follow-on actions are suggested in the inventory area, both long-and short-term?
- j) What recommendations can be made regarding on effective total transfer of resource inventory responsibilities to Nigerien professionals?

D. Forestry Research Specialist

The individual must have experience in developing research programs and in forest management in arid zones, must have experience in interactive agricultural /forestry research (agroforestry, soil and water conservation, intercropping).

Preference will be given to candidates with French language ability, with more than five years professional experience, and with work experience in Africa (particularly Sahelian Africa). However, because of the highly specialized nature of this technical field, candidates with superior technical qualifications who do not have any or all of the above (language facility, etc.) will be given full consideration. The project will supply interpreter services, if necessary.

1. Questions concerning model sites and forest management issues

- a) Concerning the efforts at the Guesselbodi Forest, what have been the results in terms of protection, rehabilitation and production? This question should be answered in quantitative terms, e.g. hectares rehabilitated, steres of sustained production, and costs and benefits of various operations.
- b) What techniques have been developed through the Guesselbodi experience in the areas of resources identification, protection, rehabilitation and production? How broadly can these techniques be applied after the project has ended?
- c) The Guesseldoli Forest Cooperative is an interesting experiment in local population participation in forest management. The fact that the Cooperative is essentially a private enterprise is of particular relevance. Its structure should be carefully examined to determine the staying power and replicability of this type of management structure.
- d) What extra inputs will be necessary for the Guesselbodi operation to become self-sustaining, and where will these come from?
- e) Concerning the model site of Gorou Bassounga, what has been accomplished in terms of management planning, and with what resources will management be implemented after the FLUP Project?
- \* f) What has been accomplished in the field of methods for site identification? Can these methods be applied by Nigerien professionals in determining areas for future management efforts?
- \* g) What other sites have been identified, what is their anticipated utilization, and what resources will be needed to put them into operation?
- h) How functional and how effective are the working relationships between the "Service de l'Amenagement des Forêts Naturelles et de la Commercialisation des Produits Forestiers" and the Project?

- g) To what extent will the SAFNC be able to perform its duties without external support?
- \* h) Are the forest management and conservation techniques being developed adequate for Niger's long-term needs? Will additional efforts be necessary, and if so in what specific aspects?
- \* i) Are the Nigerien professionals being adequately trained in forest management and conservation techniques? Do they have the necessary technical background?
- j) What recommendations can be made regarding an effective total transfer of model sites responsibilities to Nigerien professionals?
- k) Do the scopes of work of the technical advisors represent Project goals and objectives? To what extent have they satisfied their scopes of work?
- \* l) What other follow-on actions are suggested in the model sites area, both long-and short-term specially in research needs.
- m) What is the total and projected capacity for land use, agronomy, natural management research in Niger? What exists in USAID/Niger bilateral portfolio that can assist in this area?

2. Questions concerning, training, documentation and extension issues

- a) To what extent does the planning unit's organization and implementation plan satisfy the requirements of the Fourth Amendment in the areas of documentation, training and extension? Are there any major changes, and if so, are they justified?
- \* b) Is the documentation center an effective information tool in support of the planning process? Is the library a functional source of information? To what degree can it operate without outside help?
- c) What has been accomplished in the field of training Nigerien professionals in the various specialities involved in the project?
- \* d) What has the Project accomplished in the field of long-term training? Should any follow-on be considered? What are the constraints to training? Recommendations for eliminating such constraints?

- e) What has the project accomplished in the field of extension, e.g. forestry training programs?
- \* f) To what extent have Project experiences been made available to formal forestry training programs?
- g) What recommendations can be made regarding an effective total transfer of training, documentation and extension responsibilities to Nigerien professionals?
- h) Does the scope of work of the technical advisor represent Project goals and objectives? To what extent has she satisfied her scope of work?
- \* i) What other follow-on actions are suggested in these areas, both long-and short-term?

\*Questions to be addressed jointly with the Resource Inventory Specialist.

#### D. Forestry Research Specialist

The individual must have experience in developing research programs and in forest management in arid zones, must have experience in interactive agricultural /forestry research (agroforestry, soil and water conservation, intercropping).

Preference will be given to candidates with French language ability, with more than five years professional experience, and with work experience in Africa (particularly Sahelian Africa). However, because of the highly specialized nature of this technical field, candidates with superior technical qualifications who do not have any or all of the above (language facility, etc.) will be given full consideration. The project will supply interpreter services, if necessary.

#### 1. Questions concerning model sites and forest management issues

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- b) What techniques have been developed through the Guesselbodi experience in the areas of resources identification, protection, rehabilitation and production? How broadly can these techniques be applied after the project has ended?

- c) The Guesseldoli Forest Cooperative is an interesting experiment in local population participation in forest management. The fact that the Cooperative is essentially a private enterprise is of particular relevance. Its structure should be carefully examined to determine the staying power and replicability of this type of management structure.
- d) What extra inputs will be necessary for the Guesselbodi operation to become self-sustaining, and where will these come from?
- e) Concerning the model site of Gorou Bassounga, what has been accomplished in terms of management planning, and with what resources will management be implemented after the FLUP Project?
- \* f) What has been accomplished in the fields of methods for site identification? Can these methods be applied by Nigerien professionals in determining areas for future management efforts?
- \* g) What other sites have been identified, what is their anticipated utilization, and what resources will be needed to put them into operation?
- h) How functional and how effective are the working relationships between the "Service de l'Amenagement des Forêts Naturelles et de la Commercialisation des Produits Forestiers" and the Project?
- g) To what extent will the SAFNC be able to perform its duties without external support?
- \* h) Are the forest management and conservation techniques being developed adequate for Niger's long term needs? Will additional efforts be necessary, and if so in what specific aspects?
- \* i) Are the Nigerien professionals being adequately trained in forest management and conservation techniques? Do they have the necessary technical background?
- j) What recommendations can be made regarding an effective total transfer of model sites responsibilities to Nigerien professionals?
- k) Do the scopes of work of the technical advisors represent Project goals and objectives? To what extent have they satisfied their scopes of work?

- \* 1) What other follow-on actions are suggested in the model sites area, both long and short term specially in research needs.
- m) What is the total and projected capacity for land use, agronomy, natural management research in Niger? What exists in USAID/Niger bilateral portfolio that can assist in this area?
- 2. Questions concerning, training, documentation and extension issues
  - a) To what extent does the planning unit's organization and implementation plan satisfy the requirements of the Fourth Amendment i the areas of documentation, training and extension? Are there any majopr changes, and if so, are they justified?
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  - c) What has been accomplished in the field are Constraint to training? Recommendations for eliminating such constraints?
  - \* d) What has the Project accomplished in the field of long term training? Should any follow-on be considered? What are Constraint to training? Recommendations for eliminating such constraints?
    - e) What has the project accomplished in the field of extension, e.g. forestry training programs?
  - \* f) To what extent have Project experiences been made available to formal forestry training programs?
  - g) What recommendations can be made regarding and effective total transfer of training, documentation and extension responsibilities to Nigerien professionals?
  - h) Does the scope of work of the technical advisor represent Project goals and objectives? To what extent has she satisfied her scope of work?
  - \* i) What other follow-on actions are suggested in these areas, both long and short term?
  - \* Questions to be addressed jointly with the Resource Inventory Specialist.

**APPENDIX B**  
**LIST OF PEOPLE CONTACTED**

**A.I.D./U.S. Embassy:**

Richard Bogosian ..... U.S. Ambassador to Niger  
R. Carey Coulter ..... Deputy Mission Director  
Dayton Maxwell ..... General Development Officer  
Dennis Panther ..... FLUP Project Manager  
G. Flynn Fuller ..... Manager, NAAR Project  
Moussa Salley ..... Acting Project Officer, ASDG Project  
Ernie Gibson ..... Agriculture Development Officer  
Kiefli Nogashe ..... Agriculture Sector PSC (Economist)  
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Louanne Douris ..... Program Officer

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John Heermans ..... Technical Advisor, Model Sites  
Gregory Minnick ..... Technical Advisor, Model Sites  
James Alegria ..... Peace Corps Volunteer, Quantitative  
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Cecelia Polansky ..... Technical Advisor, Training  
Pamela Alegria ..... Director, Documentation Office

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Mamane Djiko ..... Forester

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Lawally Ada ..... District Forester, Tahoua

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Soumaila Abdou ..... Ministry of Planning, Environment  
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Moussa Hassane ..... INRAN, Environmental Officer

OTHER DONORS:

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CARE - Steven Dennison ..... Technical Advisor for Agroforestry  
in for West Africa

GTZ - Bernd Harris ..... Niger Forestry Representative

PEACE CORPS - David Blaine..... Staff

Service of German Volunteers

Peter Sohr ..... Niger Delegate

Jurgen Hartwig ..... Landscape Architect Tahoua

UNDP - Samuel Ngambi ..... Adjunct Resident Representative

World Bank

Alio Hamidil ..... Director, "Project Forestier"

Helmet Sanger ..... Director, Niger Mission

Francis Mody ..... Mission Resident

Pierre Mignon ..... Energy Officer

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**APPENDIX C**  
**REFERENCES**

- A.I.D. A.I.D. Evaluation Handbook. A.I.D. Program Design and Evaluation Methodology. Report No. 7. Washington, D.C.: A.I.D., 1987.
- A.I.D. Annual Budget Submission, FY 1989; Niamey, Niger: USAID/Niger, 1987.
- A.I.D. Conserving Tropical Forests in Developing Countries: A Report to Congress on Implementation of Section 118 of the Foreign Assistance Act. Washington, D.C.: A.I.D., 1987.
- A.I.D. Amendment Number 5 to the Project Grant Agreement between the Republic of Niger and the United States of America for Forestry and Land Use Planning. Niamey, Niger: A.I.D., 1986.
- A.I.D. Country Development Strategy Statement, FY 1988 - Niger. Niamey, Niger: A.I.D., 1986.
- A.I.D. Country Development Strategy State, FY 1988 - Niger. Annex D: Perspective on Niger's Natural Resources. Niamey, Niger: A.I.D., 1986.
- A.I.D. Forestry and Land Use Planning Project Revised Implementation Plan. Niamey, Niger: A.I.D., 1984.
- A.I.D. Fourth Amendment to the Project Agreement between the Republic of Niger and the United States America for Forestry and Land Use Planning. Niamey, Niger: A.I.D., 1984.
- A.I.D. Niger Forestry and Land Use Planning Project (683-0230) Report of the Mid-Term Evaluation. Niamey, Niger: A.I.D., 1983.
- A.I.D. Draft Environmental Profile on Niger. Washington, D.C.: A.I.D. (unpublished), 1980.
- A.I.D. Project Grant Agreement between the Republic of Niger and the United States of America for Forestry and Land and Use Planning. Niamey, Niger: A.I.D., 1979.
- A.I.D. Project Paper: Niger Forestry and Land Use Planning Project (No. 683-0230). Niamey, Niger: A.I.D., 1979.
- AID/AFR. Natural Resources Management Support Project Paper. Washington, D.C.: A.I.D., 1987.

AID/AFR. Plan for Supporting Natural Resources Management in Sub-Saharan Africa. Washington, D.C.: A.I.D., 1987.

Alegria, J. A Research Proposal by "Le Projet Planification et Utilisation des Sols et des Forêts" to Determine the Dry Weight Equations and Growth Rates for Combretum micranthum, Combretum nigricans, and Guiera senegalensis Within a One Hundred Kilometer Radius of Niamey. Niger: AID, 1986.

Alegria, J., J.G. Heermans, and G. Minnick. A Sampling System for Determining Fuelwood for Combretaceae at the Guesselbodi National Forest. Niamey, Niger: A.I.D. 1985.

Boudouresque, E., J. Heermans, and J. Thomsan. Etude d'un Site en Vue de son Aménagement. Niamey, Niger: A.I.D., 1984.

CILSS/Niger. Plan National de Lutte Contre la Desertification. Paris: CILSS, 1985.

CILSS. Note de Synthèse sur la Stratégie Forestière au Sahel. Paris: CILSS, 1977.

CILSS/UNSO/FAO. Consultation on the Role of Forestry in a Rehabilitation Programme for the Sahel. Paris: CILSS, 1976.

Club du Sahel. Transformation de L'Environnement dans le Sahel Ouest Africain. Paris: OECD/CILSS/Club du Sahel, 1984.

Club du Sahel. Analyse du Secteur Forestier et Propositions. Le Niger. Vol. I, Rapport. Paris: Club du Sahel, 1981.

Congress of the United States of America. Special Foreign Assistance Act of 1986. Washington, D.C.: U.S. Congress, 1986.

Daus, S.J. Report of Work Conducted by the Resources Inventory and Monitoring Section during the Period 1 January, 1984 to 31 December, 1985. Niamey, Niger: A.I.D. 1986.

Daus, S.J. Quarterly Report: Resource Inventory and Mapping Section (RIM) of FLUP. Niamey, Niger: A.I.D., 1983.

Dennison, S. Majjia Valley Windbreak Evaluation Niger: Briefing Document. Niamey, Niger: CARE, 1986.

FAO/UNDP. Aménagement et Reboisement Forestiers a Buts Multiples Project Document. Niamey, Niger: UNDP, 1987.

FAO. The Tropical Forestry Action Plan (2nd ed.). Rome: FAO, 1987.

FAO. Land Evaluation for Forestry. FAO Forestry Paper No. 48. Rome: FAO, 1984.

FLUP Project. First Internal Evaluation Meeting on Project Implementation. Summary of Major Points. Niamey, Niger: A.I.D., 1986.

Harou, P.A. FLUP Redesign Planner/Economist Report. Niamey, Niger: A.I.D., 1984.

Heermans, J.G. "The Guesselbodi Experiment: Bushland Management in Niger." Proceedings: Conference on Sustainable Development. London: IIED, 1987.

Heermans, J., Boudouresque, E., S.S. Mamane. Plan de Travail pour la Premier Pacelle dans la Foret Classee de Guesselbodi. Niamey, Niger: A.I.D., 1983.

Heermans, J.G. and G. Minnick. Guide to Forest Restoration and Management in the Sahel Based on Case Studies at the National Forests of Guesselbodi and Gorou - Bassounga Niger. Niamey: A.I.D., 1987.

International Union of Forest Research Organization (IUFRO). A Proposal to Create an International Council for Forestry Research in Developing Countries (INCOFORE). Corvallis, Oregon: IUFRO, 1986.

IUFRO. Increasing Productivity of Multipurpose Lands: IUFRO Research Planning Workshop for Africa, Sahelian and Northern Sudanian Zones. Nairobi: IUFRO, 1986.

Kinni, A. and J.E. Seve. "Perspectives on the Forest Resource Sector in the Republic of Niger." Proceedings: Land and Resource Evaluation for National planning in the Tropics Conference. Chetumal, Mexico: Unpublished, 1987.

Programme Allemand CILSS (PAC). Programme Global Niamey Nord. Report of the Preparatory Mission. Niamey, Niger: GTZ/PAC, 1987.

Project PUSF. Rapport d'Execution du Projet pour la Periode Allant du 1er Mai 1984 au 31 Mars 1986 et Perspectives d'Avenir. Niamey, Niger: A.I.D., 1986.

Republique du Niger. Plan de Developpement Economique et Developpement Social de Niger, 1987 - 1991. Niamey, Niger: Ministere du Plan, 1987.

Rochette, R.M. Proposed Guidelines for Implementing the Regional Desertification Control Strategy in the Sahel. Paris: OECD/CILSS/Club du Sahel, 1985.

Seve, J.E. Rapport du Conseiller Technique en Planification Economique at Coordinateur des Activites du Projet PUSF. Niamey, Niger: A.I.D., 1986.

Thomson J. Niger's FLUP Project: A Proposal to Analyze Human Resources Survey and Natural Resources Inventory Data. Niamey, Niger: A.I.D., 1983.

Thomson, J. Guesselbodi Forest: Alternative Frameworks for Sustained Yield Mgt. Niamey, Niger: A.I.D., 1981.

Treadwell, B.D. Review of Project Information Requirements and Recommendations for a Remote Sensing Program. Niamey, Niger: A.I.D., 1982.

Weber, F.R. Economics & Ecologic Criteria: Forestry/Anti - desertification Program (Sahel). Niamey, Niger: A.I.D., 1977.

# Department of State

TELEGRAM

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ACTION AID-00

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ACTION OFFICE STFM-02  
INFO AAF-03 AFFW-04 AFTR-05 STAG-02 STEY-02 SAST-01 STEN-01  
ES-01 RELO-01 TELE-01 /023 AI XI

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E.O. 12356: N/A

TAGS:

SUBJECT: NIGER, FOREST AND LAND USE PLANNING (683-0230)  
MISSION COMMENTS ON THE FLUP EVALUATION

REF: 87 STATE 302813

1. MISSION ACCEPTS SUBJECT EVALUATION ON CONDITION THAT FOLLOWING DETAILED MISSION COMMENTS ON THE FINAL DRAFT OF THE FINAL PROJECT EVALUATION ARE INCLUDED AS ANNEX.

THE DRAFT EVALUATION REPEATS OFTEN THAT THE TWO MAIN ISSUES/FLAWS/PROBLEMS WITH THE PROJECT ARE 1) THE LACK OF COORDINATION AMONG THE EXPATRIATE TEAM MEMBERS DUE TO THE ABSENCE OF AN OFFICIAL EXPATRIATE TEAM LEADER, AND 2) THE NON-FUNCTIONALITY OF THE PLANNING AND DOCUMENTATION SERVICE (SPD).

WHILE IT IS TRUE THAT THE SPD, AS A UNIT OF THE FOREST AND WILDLIFE DIRECTORATE (DFF), IS NOT FUNCTIONING AS ENVISIONED IN THE FOURTH PROJECT AMENDMENT, IT IS UNFAIR TO SAY THAT PLANNING, TRAINING, ECONOMIC ANALYSES, COORDINATION AND TECHNOLOGY TRANSFER ARE NOT BEING DONE. PLANNING AND COORDINATION IS BEING DONE EXTENSIVELY BOTH IN THE DFF AND THE "PROJECT" WITHOUT THE BENEFIT OF IT BEING INSTITUTIONALIZED. SEVE'S ORGANIZATION AND IMPLEMENTATION PLAN, THE COMPLETE RESTRUCTURING OF THE DFF, THE LAST EXTENSION, THE MANNER BY WHICH CONTRACTOR SOWS WERE DRAWN UP AND THE THREE SUCCESSFUL TRAINING SEMINARS ARE EVIDENCE OF THIS.

THE EVALUATION ASSUMES THAT THE REVISED IMPLEMENTATION PLAN AND THE FOURTH PRO. AG. AMENDMENT SUGGEST THAT THE PROJECT BE CONSOLIDATED UNDER THE SPD. THIS ASSUMPTION IS INCORRECT. THE ABOVE DOCUMENTS POINTED OUT THE RATHER AUTONOMOUS ORIENTATIONS OF THE TWO TECHNICAL SECTIONS OF THE PROJECT (MODEL SITES AND INVENTORY) AND THE VARIOUS DEPARTMENTS OF THE FOREST SERVICE, AND RECOGNIZED A DISTINCT LACK OF COMMON GOALS. THE REVISED IMPLEMENTATION PLAN (RIP) SUGGESTED THE NEED FOR A PLANNING UNIT WITHIN THE DFF IN ORDER TO FORGE THE DFF AND THE PROJECT COMPONENTS INTO AN INTEGRATED TECHNICAL TEAM ORGANIZATION BY EXAMINING LESSONS LEARNED AND PRESENTING THEM IN ANALYTICAL FORM WHICH WILL THEN PROMOTE NECESSARY CHANGE. IN EFFECT, A NEW COMPONENT WAS ADDED TO THE PROJECT MAKING A TOTAL OF THREE SEPARATE COMPONENTS. IT SHOULD BE RECOGNIZED THAT LONG RANGE PLANNING AND ANALYSIS IS STILL AS FOREIGN A CONCEPT AS RESOURCE MANAGEMENT WAS WHEN THE PROJECT STARTED.

THE "TEAM" IS MENTIONED THROUGHOUT THE DOCUMENT. THOUGH THE RIP DOES MENTION THE ADDITION OF A TEAM LEADER TO COORDINATE ACTIVITIES, IT DOES NOT REALLY MAKE PROVISION (TIME OR EXPERTISE REQUIRED) FOR TEAM MANAGEMENT. THERE ARE TWO DIFFERENT ROLES BEING MIXED-UP, COORDINATOR OF THE CONTRACTOR INPUTS AND MANAGER OF THE PROJECT INPUTS. THE EVALUATION SUGGESTS THAT THE "TEAM" IS ONLY THE EXPATRIATE STAFF. WE PREFER TO THINK THE TEAM INCLUDES EVERYONE CONNECTED WITH THE

DFF.

THE FOLLOWING COMMENTS ARE KEYED TO PARAGRAPH NUMBER.

1.10.5, LAUDS THE GRASS ROOTS APPROACH TO DEVELOPMENT BUT LEAVES OUT THE EXTENSIVE TOP DOWN EDUCATION PROCESS WHICH WAS NECESSARY TO ALLOW THIS TO HAPPEN. THIS IS WHY, IN POINT 1.10.3 IT TOOK SEVEN YEARS AFTER THE START OF THE PROJECT TO GET THE COOPERATIVE OPERATIONAL.

1.10.8, WE DO NOT UNDERSTAND WHAT THIS PARA IS SUGGESTING OR LEADING TO. WHAT DOES LAND USE PLANNING IN OTHER SAHELIAN COUNTRIES HAVE TO DO WITH FLUP?

1.10.137, THE SEMINARS: THEIR IMPACT, RESULTS; RECOMMENDATIONS SHOULD BE MENTIONED.

2.1 9TH PARA, AGAIN, SOME CONFUSION ON THE ROLE OF THE TEAM LEADER... SOMEONE REPRESENTING THE TECHNICAL ASSISTANTS... THIS IS PERSONNEL MANAGEMENT/LOGISTICS NOT TEAM COORDINATION.

2.1 LAST PARA, AN ANALYSIS OF HOW LONG IT WILL TAKE TO ACHIEVE THE ORIGINAL PROJECT OBJECTIVES IS AN IMPORTANT MISSING ELEMENT. SIX MONTHS IS

DISCUSSED/ASSUMED THROUGHOUT BUT IS IT NOT ALSO POSSIBLE IT MAY TAKE 2-6 YEARS? (IT IS DOUBTFUL THAT A FUNCTIONAL PLANNING UNIT CAN BE STAFFED, EITHER WHOLLY OR IN PART, TRAINED AND EXPECTED TO CARRY ON WITHOUT TECHNICAL ASSISTANCE (TA) IN SIX MONTHS).

2.2.2: THE ECONOMICS ASPECTS OF SEVE'S SCOPE OF WORK HAVE STARTED. ANALYSES AND MODELING IS NEAR ITS LIMIT, HOWEVER, BECAUSE OF THE LONG-TERM NATURE OF FORESTRY RESEARCH AND THE LACK OF A STRONG RESEARCH PROGRAM HERE EQUALS LIMITED DATA TO WORK WITH. PRINCIPLES CAN BE TRANSFERRED, OF COURSE, BUT SEVE DOES NOT HAVE EVEN A PART-TIME ECONOMIST TO WORK WITH.

2.3.1, LAST PARA: A TECHNICAL HOST COUNTRY CONTRACTOR CANNOT (BUT A PSC CAN) BE GIVEN RESPONSIBILITY FOR OVERSIGHT OF FUNDS.

2.3.2: THE EVALUATION REPEATEDLY LEAVES OUT THE IDEA (FACT ACTUALLY) THE PROJECT DIRECTOR IS THE "TEAM LEADER" AND DOES PROVIDE, TO A CERTAIN EXTENT, DIRECTION AND COORDINATION. THE EXTENT AND EFFECTIVENESS OF HIS EVALUATION.

2.3.3: THE AID PROJECT MANAGER IS NOT THE DE FACTO PROJECT COORDINATOR. THE PROJECT DIRECTOR IS.

2.6.4: USAID TOTALLY DISAGREES WITH THIS PARAGRAPH.

2.6.5: THE FIRST MISSION REVIEW READ: "3.6.5: A FIRST BULLET SHOULD DESCRIBE HOW THE TEAM SHOULD BE CONSTITUTED/MANAGED." THE QUESTION IS STILL UNANSWERED. THE "HOW" IN THE QUESTION REFERRED TO HOW DO YOU GIVE AUTHORITY TO SOMEONE WHEN THE PROJECT DIRECTOR HAS IT? A SUGGESTION ON THE MECHANICS OF TAKING AUTHORITY AWAY FROM HIM WOULD LOGICALLY FOLLOW, BUT IS BEYOND THE SCOPE OF THE EVALUATION. WHAT WE WERE HOPING WOULD COME OUT OF THIS SECTION WAS THAT.

BECAUSE THIS PROJECT IS A "PROJECT" WITH HOST GOVERNMENT CONTRACTORS AND NOT A "PROGRAM" WITH PSC OR INSTITUTIONAL CONTRACTORS, DIRECTION AND COORDINATION MUST COME FROM THE GOM PROJECT DIRECTOR; IF THE PROJECT IS NOT COORDINATED PROPERLY BY THE PROJECT DIRECTOR; A FOLLOW-ON EFFORT (NOT THE CURRENT PROJECT) MUST BE DESIGNED TO ELIMINATE THIS PROBLEM.

2.6.9: THE PROJECT TA HAS ESTABLISHED AS CLOSE A RELATIONSHIP WITH THE WORLD BANK (WB) AS THE WB WILL ALLOW. PROBLEMS ENCOUNTERED THUS FAR ARE BEYOND THE SCOPE OF THE PROJECT AND THE NATIONAL LEVEL. THIS PROBLEM IS OF INTERNATIONAL PROPORTION.

3.1.10: THIS STILL IS A MAJOR POINT. THE FORESTRY CODE DOES NOT EMPHASIZE PROTECTION (PAST PRACTICE HAS EMPHASIZED PROTECTION), IT IS A VERY CLEAR GUIDE OF THE ADMINISTRATIVE PROCEDURES (ONCE A MANAGEMENT PLAN IS DRAWN UP) TO GET A PLAN AUTHORIZED. THE MAIN REASON IT

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TOOK SO LONG TO GET GUESSELBODI FORMALIZED WAS THAT  
THERE HAD NEVER BEEN A REASONABLE MANAGEMENT PLAN PUT  
FORTH BEFORE; PROTECTION WAS ALL THEY KNEW HOW TO DO;  
SO, THE GDM (THE TOP-DOWN APPROACH) HAD TO BE CONVINCED  
THAT THIS PLAN WAS NOT GOING TO DESTROY THE FOREST  
(WHICH THEN ALLOWED FOR THE SUCCESSFUL BOTTOM-UP  
APPROACH). GUESSELBODI WAS DESIGNED TO BE A PRECEDENT  
MAKER/MODEL SITE AND IS SUCCESSFUL.

3.1.14 AND 15: SOME CONFUSION HERE ABOUT WHAT THE  
MISSION WAS REALLY ASKING. WE THOUGHT WE WERE ASKING THE  
TEAM TO ASSESS WHAT WAS GOING ON IN THE NATURAL RESOURCE  
MANAGEMENT (NRM) RESEARCH SECTOR IN GENERAL AND  
RECOMMEND WHERE THE AID PROJECT IN THE FUTURE COULD  
REINFORCE IT.

2. SEPTEL FOLLOWS WITH SOW FOR PHASE II PID EXERCISE.  
BOGOSIAN

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